JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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VOL. CVI., No. 2405.—TUESDAY, JUNE 15, 1909.

EDITORIAL NOTES—GAS, &c.

The Sequel to the Gas Section.

RATHER late in the day, but unavoidably so, the Committee of the Gas Engineering Section of the Franco-British Exhibition of 1908, have rendered the final account of their stewardship. Now that the so-called International Exhibition at Shepherd's Bush is in as full swing as it can ever hope to be, the demonstration to which the report and accounts of the Committee refer seems somewhat remote from the present. But as a matter of fact, it is not a great while ago. The Franco-British Exhibition only closed last October; and the Committee have found that a considerable amount of final adjustment, in which several parties were concerned, has had to be made. But it has now come to an end; and the Committee are no doubt extremely glad, no matter how much their hearts were in the work, to see the close of it. Unquestionably, the satisfactory thing about it, from their point of view, is that they have come out of the enterprise with an account in which the receipts balance expenditure. Had, however, the Committee been better supported, the work would have been easier and far more pleasant; and they would have been in a position to have accomplished something still more effective. In point of fact, of a revenue of £4327, with which the Committee had to work, £4057 was subscribed by only 148 gas undertakings; and after all the payments incidental to space, building, furnishing, &c., had been made, the Committee had considerably less than £1000 for the running of the exhibition for six months, including gas, salaries, fees, &c. That they did so much on so little during the exhibition is due to management and the friendly assistance that was at hand; but more might have been effected in the way of solid work had the funds flowed in a little more freely. The experiences gained on the occasion will be exceedingly valuable in the future organization of demonstrations of the advances of the gas industry, as well as their general conduct. But we will not here go into matters that are historical; simply leaving this final piece of evidence of the interesting and instructive demonstration of 1908, with a repetition of our congratulation of some months ago to the Committee, and especially to Mr. J. W. Helps, the Hon. Secretary, and Mr. D. Milne Watson, the Vice-Chairman, for the signal services they rendered. Acknowledgments of these are placed on record in the report, signed, on behalf of the Committee, by the Chairman (Mr. H. E. Jones).

The Art of the Gas Engineer.

BY distant comparison, progress is accentuated. Many of us can look back to the time when the processes of gas manufacture, distribution, and uses were comparatively simple, and displayed an amount of scientific modesty that would be treated with scant courtesy by the unthinking section of the gas novitiates of to-day. Let them turn, however, to one of the gas text-books of many years ago, and read, mark, learn, and inwardly digest (with due consideration for the variation of position) the story of the gas practices of the time, and then read a descriptive account of some modern gas-works on the large scale; and the exercise will strengthen their respect for the gas engineers of a long dead past, and heighten their admiration for the immense advances in the art of gas engineering that have been registered during (say) the last thirty years or so. Let it be remembered by them that, comparatively plain though the work of the gas engineer was in a bygone period, those earlier workers in the profession of which any man should be proud to belong in these days laid truly and well the foundations on which the more elaborate work of the present is constructed. Those earlier workers had not the same opportunities that the workers of to-day can command. They were circumscribed in what they did by the relatively small amount of business that they could gain through the at one time single application of gas (and a dear application it was in comparison with modern method), the smaller communities and limited areas supplied, and the then almost unthought-of uses of gas in industry and for domestic purposes other than lighting. The major part of the undertakings were of too small a character for the application of mechanical operation; and the incentive was not of the character that it is to-day. Moreover, in the development of structure and processes, progress along the untrodden ways had to be accompanied by severe caution. Science, too, had not come so handsomely to their aid as it has to their successors in later years, opening up fresh avenues in which to exercise ingenuity.

The art of the gas engineer has largely changed by circumstances. The extensiveness of the gas industry in these later years has given—particularly in the centres where works of considerable character and feature can be erected—scope for new conception and application, and for adaptation of known principles to new purposes. Where an engineer has the coveted opportunity of building a large complete gas-works on a new site, he has clear ground before him over which to show that gas engineering is an art that holds position with any other of the main branches of engineering. It is not in undue elaboration that the gas engineer asserts his skill, but in taking the ground before him, and laying it out in manner that will permit of free and economical working, future economical extension, and enable him to realize from the site the greatest productivity at the smallest working cost, consistent with the capital he has expended. Upon the first plotting of the ground, the working of a long future depends; and therefore upon the originator a responsibility of a no mean order rests. In the buildings and plant put on the site, there can be no hard-and-fast rules regarding the capital expenditure. A proportion of the capital expenditure may be justified by the economies it will thereafter produce; and therefore the investment, though increasing the capital per million cubic feet of production, and the capital charges per 1000 cubic feet sold, may be a perfectly good one.

Reflections such as these, and illustration of the broadened opportunities of the times for gas engineers in the exercise of their polyhedral art, are produced and presented by the description of such new works as Mr. Fletcher Stevenson has designed and constructed on an entirely new site at Foleshill for the city of Coventry, and which were inaugurated with due ceremony last Thursday. The father of the son did much splendid work in his time; and much of it is standing to testify to his skill as an engineer. But with all he did, he had not such opportunity for producing, on a single site, a combination of plant such as has fallen to the lot of one of his own sons. But there is no need to go outside Coventry to compare the past of gas engineering with the present scope that it presents. The old cramped gas-works, with many ancient parts that have done good service for Coventry, were only closed down at Whitsuntide; and it would not be unprofitable to many a young gas engineer to go and look upon the old picture and then upon the new, for the material illustration of the progress of the art which he has adopted. Something of what he would observe was sketched by us in the "JOURNAL" columns about three years since; and from what he would see now in the old works and embodied in the new, he would be able to appreciate the substantial character of the progress effected more than the totally uninitiated in these matters. Part of a gas engineer's work is invisible by being underground; and therefore it does not appeal, the same as large visible structure, to the eye of the layman in such matters. And, again, the processes and products of the gas engineer's work are now so diversified that their very extent prevents them from coming within the comprehension of any but those who live in the industry.

Singling out the new retort-house, we have there an illustration of vast changes compared with the past. The structure itself is representative of change in such buildings, and,

in the main, of similar structures of modern build, in its steel framing, and simple brick panelling, with light galvanized iron roof. Yet in it the engineer introduces a novel feature in that the main stanchions starting from the yard-level finish at the level of the body part of the overhead coal-hoppers, and act as buckstays for every alternate retort-bed. Each stanchion, too, carries the end of a main cross girder—open lattice in the centre, and plate webs at the ends, which run through the hoppers forming the side thereof. The coal delivery methods, the coke quenching and removal, the settings themselves in their several details, the simultaneous charging and discharging of the retorts—common enough to-day—are all representative of immense departures from the old order of gas-engineering practices. Then carburetted water-gas plant supplements the coal gas manufacture. The chemical works and the sulphate works on the same site are types of the varied modern requirement in knowledge of the gas engineer. In addition to gas and steam, electricity and water under pressure are employed for power, showing the need for an overlapping of the accomplishments of the gas engineer into those of the electrical and the hydraulic engineer. The provision of a well and water-tower for an independent water supply, takes the gas engineer into the realms of the specialist water-supply engineer. And the large adoption of mechanical appliances about gas-works, renders more necessary than ever the fittings shops, well-equipped with machine and other tools. With such a variety of machinery under his care, the gas engineer must, to be equal to his duty and trust, be a thoroughly good mechanical engineer.

Such general considerations as these instance the high position to which the art of the gas engineer has attained. But let it not be imagined by the young engineer that the qualified men of the profession to-day are better than the qualified men of a long past. Opportunities, as much as the growth of knowledge and the revelations of science, have produced much of what is now seen about us. Given the opportunities, the qualified gas engineers of a deep-down past—they were men of calibre as now—would have risen to the occasion, and would have answered the calls for an expanded application of their abilities.

Fuel and Other Costs of Suction-Gas Plants.

In other columns, we print a paper, and in due course shall be publishing the discussion, on the subject of the working results of water pumping-engines operated by producer gas. The author is Mr. D. Hastings Irwin; and the communication was made at the annual meeting of the Association of Water Engineers last week. The paper embraces some instructive detailed costs in connection with suction-gas plants—particularly the plant at the New Arrol-Johnston Car Company's works for generating electrical current—which will be exceedingly useful to gas engineers in compiling complete comparisons of such plants with gas-engines driven by town gas, in which later case much of the expenditure on the former, with several of the items of cost, have to be entirely cancelled. At the end of the tabulation specially mentioned, the costs per kilowatt-hour at the switchboard are given, and they amount to 0·35d. Manufacturers of suction-gas plant are frequently advertising, and dazzling manufacturers with, the low fuel costs per brake horse power by the use of such plants; but it will be seen from this table that of the 0·35d. no less than 0·2229d. represent expenses other than fuel. That is to say, the cost of the anthracite per kilowatt-hour only amounts to 0·127d.; while the other expenses—coal gas for starting and for burner, wages, water, lubricating oil, depreciation and interest, and repairs and renewals—total to 0·2229d. per kilowatt-hour. The running costs are stated by Mr. Irwin to be derived from the power-house records; the anthracite doubles used being booked up at 15s. 6d. per ton. At this figure, taking into account market vagaries in respect of prices as well as situation of the point of delivery, it can be seen how easily the item of anthracite per kilowatt-hour might be appreciably altered for the worse, and make a marked difference in the total costs.

With water engineers suction-gas plant is obtaining a considerable vogue on account of the fact that many of the situations in which pumping has to be done are somewhat away from the customary haunts of men; and therefore there has to be self-reliance in the matter of power. And it is being very generally conceded by water engineers that, with all its faults, the suction-gas plant in its costs per brake horse power is preferable in such places to steam plant. But in calculating the costs it must be done, as Mr. Emerson Dowson has recently pointed out, in a very comprehensive manner; and every case must be considered on its own merits. While on this point, there is another that has relation; and it is that where a gas-main runs past a pumping-station, the water engineer should give very careful consideration—if the gas suppliers are progressive sort of people—to the relative costs, reliability, and trouble involved of running a gas-engine on clean town gas, and a gas-engine having appended to it a suction-gas plant, with its variable quality of gas—both in respect of calorific power and cleanliness. Attention should also be given by water engineers to the points emphasized by the Inspectors under the Factory Acts in the last report of the Chief Inspector (*ante*, p. 627), as to the additional peril that suction-gas plants introduce; and this cannot be an unimportant matter for consideration at isolated pumping-stations, when perhaps only a single man is on duty. This, however, by the way. The question of costs will probably be considered the more important. For small powers, water engineers will find no particular value in the working figures for town gas given at the end of the paper. The engines here referred to are 510 brake horse power ones; and they are only worked intermittently, and then not at their full capacity, for emptying the Queen's Dock of the Mersey Docks and Harbour Board. For such emergency work, suction-gas plant cannot hope to contest for supremacy with coal gas. In the case of this dock, it may have to be emptied at a moment's notice; and, as Mr. Irwin says, the saving of the time necessary to get gas-producers into working condition is an important consideration. While the author includes for coal gas this example of working for 510 brake horse power engines, running under peculiarly disadvantageous circumstances, he only deals with 8, 40, 90, 100, and 140 horse power engines working with anthracite-fed suction-gas plant, under much more advantageous circumstances in respect of time and load, and, incidentally, with 300-horse power engines with gas-coke fed suction-gas plants. It would be more to the point if actual costs were given for engines of corresponding power and working loads, in the same detail as the particulars in the paper, from capital expenditure onwards, for the Arrol-Johnston Car Company's plant.

Passing from that, the author does one good turn for gas makers. Six years ago anthracite coal was about the only fuel capable of being used in producer-gas plants; but owing to improvements almost any fuel can nowadays be utilized. Witness is borne by Mr. Irwin that ordinary gas-works coke is perhaps the cheapest fuel at the present time, and the most readily obtained. He quotes the records of the working expenses of a 300-horse power gas-engine driving a cotton mill, and using gas coke in the producer. The fuel consumption, taken over a whole year's working, and including all stand-by losses, only averaged 1½ lbs. per horse-power-hour, with coke costing 11s. 6d. per ton delivered. This is a decided testimonial for gas coke. We make out that this represents an outlay for fuel of only 0·093d. per horse-power-hour. Where anthracite is used, the makers guarantee that the consumption shall not exceed 1 lb. per brake-horse-power-hour; and, at 30s. per ton, this would represent 0·16d., as against the 0·093d. The 30s. is not an extravagant figure to take, in view of the fact that, in the examples of water-works' use of suction-gas plant, the paper quotes 30s., 34s., and (in a test even as late as January last) 37s. 10d. per ton for anthracite delivered. This last-named price for anthracite—it is the highest mentioned in the paper—refers to a test at the Skegness Water-Works; and though the dearest fuel, the cost for fuel per 1000 gallons of water raised is said to be the lowest—viz., 0·25d.—lifting the water 210 feet. In the Alford example, with fuel at 30s. per ton (7s. 10d. less), lifting the water 235 feet, the fuel cost worked out to 0·38d. per 1000 gallons; while at Spilsby the fuel consumption (also at 30s. per ton) per 1000 gallons, lifted 145 feet, worked out to 0·33d. per 1000 gallons. If there are no mistakes, suction-gas plant working shows some considerable fuel discrepancies, in face of the 37s. 10d. and 0·25d., and the 30s. and the 0·38d. and 0·33d. In other words, the fuel used (according to our calculation) for lifting 1000 gallons of water in the Skegness trials only amounted to 1·23 lbs. per 1000 gallons; while in the Alford and Spilsby trials, which are about comparable with those made at Skegness, the fuel worked out respectively to 2·33 lbs. and 2·08 lbs. One cannot avoid, with such divergent consumptions for practically the same work, a little suspicion as to accuracy.

The Alkali Works Inspector's Annual Report.

In another part of the "JOURNAL" will be found some extracts from the forty-fifth annual report of the Chief Inspector under the Alkali Works Act (Mr. R. Forbes Carpenter). It contains, as usual, statistics in regard to the production of sulphate of ammonia; and it is gratifying to find that the gas industry still remains the chief contributor. The marked increase in 1907 over 1906 was not maintained last year, according to the figures. Mr. Carpenter believes, however, there really was quite a substantial increase; but it was necessary to review more closely the quantities of ammoniacal liquor used in the ammonia-soda industry, as errors of method were found to exist in arriving at these figures in past years. This materially affected the total recorded from gas-works for 1908, which is 165,218 tons, compared with 165,474 tons and 157,160 tons respectively in the two preceding years. An exceedingly interesting and important section of the report is that devoted to the results of Mr. Carpenter's further experiments on the carbonization of coal, in carrying out which he had the collaboration of his able Assistant (Mr. S. E. Linder, B.Sc.). Their attention was more specially directed to the investigation of some of the reactions producing hydrocyanic acid, as one of the bodies resulting from the carbonization of coal at high temperature; and, pending a fuller notice of this portion of the report which we hope to give shortly, attention may be directed to the summary of the conclusions arrived at. Investigations of this nature are almost beyond the resources of the laboratory at Mr. Carpenter's disposal; and he considers that only in technological institutions such as those at Carlsruhe and at the Leeds University can such work be properly undertaken. He and his colleague have entered upon a wide field of research; it is to be hoped that future work in the same direction may be carried out under more suitable conditions. It cannot but be helpful to the gas industry.

Honest New Gas Investments.

It would be a great pity if the operations of certain company promoters had the effect of shattering confidence and drying up the sources of capital supply for the starting of new gas enterprises. Spread about the country there are many small districts in which the populations and local industries are growing, and in which a supply of gas would be welcomed as a convenience. But such districts can only be supplied, with advantage to the residents and those who invest capital in providing the means of supply, by care in spending capital, and in planning and providing plant, and by subsequent prudent administration. Several such undertakings have come under notice during the last two or three years, in connection with which the prospectuses have been privately circulated, and the money obtained from a limited circle of friends. Genuineness has been endorsed by the appearance on the prospectuses in one capacity or another of the names of men of recognized position in the gas industry; and such concerns are sound and legitimate for capital investment. It is not in the immediate stages of investment in concerns of the kind that the full return on the capital can be secured. There must, as every business man knows, be a period of development, before the plant is utilized to an extent enabling the payment of a dividend. But history shows the original shareholders in legitimate gas concerns established under proper auspices have nothing to complain about either as to return on, or value of, their investment.

And an Example.

Just as an illustration of the character of Company in view, mention may be made of the most recent prospectus that has reached us. It is from the Directors of the Stanford-le-Hope Gas Company, Limited; and they are inviting applications for 2130 ordinary shares of £1 each, with dividend limited to 10 per cent. per annum. The present capital is only £3330, of which merely £460 represents debentures. The Directors of this Company are men bearing such well-known names as Mr. William Surridge, Mr. James Cloudsley, J.P., and Mr. Frederick R. Smith. The Secretary is Mr. William Cash, F.C.A.; and the Board are being advised, in the capacity of Consulting Engineers, by Messrs. Corbet Woodall and Son. The Company have a Provisional Order dated 1905; but nothing was done with it until last year, when the Directors and a few of their friends found a sum of money which has been applied towards the payment of the cost of the works and laying mains. The area of supply has a frontage to the River Thames of about 5 miles; and there are some considerable manufacturing undertakings in the district. In Stanford alone, a preliminary canvass has resulted in provisional applications for a supply by 130 consumers; and after the supply is given in August next, then, as opportunity offers, the Directors will be considering the supply of the other parishes within the Company's limits. Negotiations are also in progress for the public lighting. This Company is quoted as an example of an honest gas investment, as distinguished from company promoters' over-capitalized concerns.

High-Power Graetzin Lamp on View.

Members of the Institution in London this week should not fail to inspect after dark the high-pressure inverted lamps now being used for lighting Fleet Street. Temporarily one of them has been displaced—the one on the pavement column under the Law Courts clock—and its position is now occupied by a high-pressure, and extraordinarily high candle power, Graetzin inverted lamp, such as is used for the lighting of the streets of Berlin. The members of the deputation of the City Corporation who went to the Continent recently to study the systems of street lighting in the principal cities, saw these lamps in Berlin; and a desire was expressed to have one fixed in a street of the City, so that the Lighting Committee might inspect it. Messrs. J. & W. B. Smith, agents for the lamp, of Farringdon Road, were asked to fit one up. This has been done; and Mr. W. J. Liberty, the Lighting Inspector of the City, has decided to let the lamp remain in position during this week, so as to give members of the Institution who desire to do so an opportunity of viewing it. The lamp is a triple-burner one; and the consumption per hour per burner is approximately 28 cubic feet, or 84 feet the three burners. Two of the burners are turned off at midnight, and only one is left alight. Professor Drehschmidt, of Berlin, accords to the lamp, as the result of photometrical tests, an illuminating power (using Berlin gas) of 5000 Hefner units, or 4500 British standard candles, which would represent an efficiency of about 52 candles per cubic foot of gas. There is one point we ought to emphasize. The lamp for the purpose of inspection by the Lighting Committee of the City Corporation had to be erected in a hurry; and it certainly would have been an advantage to have had it on a higher column, so as to have obtained a better diffusion of the light. The standard within the harp head of which the lamp is fixed was erected of a height suitable for carrying a 1500-candle power lamp; while in Berlin these higher total candle-power lamps are on standards of greater height.

The Lesson of Salford.

Whatever may be the result to the Salford Corporation Bill of the recent decision arrived at by the House of Lords with reference to the gas clauses, it seems that the decision will not have been given in vain. Already some members of the Belfast Gas Committee have taken heed of the lesson conveyed by the views to which the Lords Committee gave expression. A proposal of the Gas Committee to increase the discount allowed to smaller consumers, so as to bring it into line with that granted to large users of gas, was referred back to them some weeks ago for further consideration; but at their last meeting they brought before the Council practically the same recommendation again—the Chairman remarking that the decision which the Lords Committee had meanwhile given on the Salford Bill had induced the members of the Gas Committee who were formerly opposed to the increased discount to change their minds, so that now the Committee were unanimous on the subject. While pointing to the decision of the Lords Committee, that 1 per cent. on outstanidng capital might be contributed in aid of the rates, he added that they hoped to do better than this in Belfast, by continuing to pay the dividends and sinking fund on stock issued for the new City Hall, which would amount to between 3 and 4 per cent. on the outstanding liabilities. This is a nice little relief for the ratepayers, and one with which they ought to be more than satisfied. At any rate, it is certain they cannot longer look to the gas undertaking for the huge sums in rate-relief which have been contributed in the past. In so far as it may strengthen the hands of the Committee in enforcing this altered policy, the decision of the Lords Committee in the Salford case will certainly have accomplished good.

Municipal Gas-Works Results.

Among the instalment of municipal gas-works results for the past financial year which is recorded in the present issue, it will be seen that both increases and decreases in consumption figure. There is a profit at Bury of £5689, of which one-half is carried to the credit of the general rate, while the other half goes to the credit of the gas consumers. In the past ten years the make of gas has increased from 340 million to 427 million cubic feet. The amount available for the relief of the rates at Carlisle is £463, compared with £3634 last year; but the difference is accounted for by various items of extraordinary expenditure, a reduction in price to prepayment consumers, and a falling off in the receipts from residuals. From Colwyn Bay comes the report of a "loss" of £1900; but as apparently £1000 of this is due to the expense of lighting the streets, the situation is not so bad as this "free lighting" paints it. There will be general agreement with the opinion of the Chairman of the Committee that "it is time the Council began to pay for the lighting of the town, instead of putting this expense on the gas and electric light concerns." A good deal of money has lately been spent on the works, which naturally necessitates greater provision for interest and sinking fund; and efforts will no doubt be successfully made to reduce the 14 per cent. of unaccounted-for gas. The final balance of profit for the year at Coventry, including the amount brought forward, is £3248, which, considering the state of trade during the twelve months, the Committee think may be regarded as very satisfactory. The intention of the Committee is to pay £2000 over to the district fund, and to carry forward the balance. Depression in trade and competition by electricity have led to a less satisfactory result than in previous years at Loughborough. There has been a 10 per cent. diminution in the output of gas; and the extent to which the profit has been reduced has had the effect of placing the profit and loss account £286 to the bad, which was unanticipated at the beginning of the financial year. There is a net profit of £672 at Oldbury; and the report is—considering that during the year the price of gas was reduced 2d. per 1000 cubic feet, and that trade has been bad—regarded as a satisfactory one. The make of gas per ton of coal carbonized comes out at 12,202 cubic feet; and the quantity unaccounted for, at 4·95 per cent. Stafford is able to show an increased output of 6¼ million cubic feet, on a make of nearly 204 million cubic feet; and this is accompanied by the remarkably satisfactory leakage figure of 1·29 per cent. Of the net profit of £5660, £3000 has been transferred in relief of the rates; while a sum of £393 has been ordered to be distributed among the employees under the profit-sharing scheme. The figures quoted at the meeting of the Council show that the Stafford gas undertaking has had a highly successful career.

The Brockenhurst Promotion.

During last week the Brockenhurst Gas Company prospectus reached shareholders in certain prosperous gas undertakings. Invitation is made by the Brockenhurst Directors for applications for the respectable amount of £9500 in shares and £3000 in first mortgage debentures. A condition attached to this issue is one of the old baits of both the gas and water company promoting groups in the City. "Under an agreement entered into to construct the Company's gas-works, and lay mains, &c., 6 per cent. interest is guaranteed on the present issue of ordinary shares for a period of two years;" and "the first full six months' interest will be paid on the 31st October next on all shares then fully paid up." We should like to know whether the agreement referred to is with the Finance and Construction Company, Limited. At the top of the prospectus, the Engineer reports that he estimates the revenue of the Company will, within a reasonable time of the establishment of the undertaking, be more than sufficient to pay 8 per cent. dividend on the present issue. Turning to the next page of the prospectus, it is seen that A. F. Painter is the "Consulting Engineer" referred to; and the address at the top of his report is St. Stephen's Chambers, Telegraph Street. At this address there is a fairly big nest of gas and water companies that have been hatched there. We have a substantial list of these Companies in connection with which the name of A. F. Painter appears as Engineer. Grateful indeed should we be to Mr. Painter if he would furnish us with the printed accounts for last year of all the Companies upon which he has reported, to satisfy ourselves as to whether his predictions have been fulfilled. We see that the Directors of this Brockenhurst Company are Frederick Cullimore Philpott, George Capes, and Arthur Henry Brown. Frederick Cullimore Philpott was one of the Directors of the Mid-Oxfordshire Gas Company, about the finances of which a Parliamentary Committee thought so little that, on grounds of public policy, they unanimously refused the Bill promoted to give the concern statutory standing. Messrs. E. O. Preston and Co. had a finger in that particular pie; and they were at the time (we suppose still are) holders of the founders' shares in the Finance and Construction Company. A Mr. Painter was (perhaps is) a holder of shares in the Finance and Construction Company. The Water and Gas Securities Exchange, Limited, of Victoria Street, S.W., were active movers (as correspondence by us shows) in trying to get capital for the Mid-Oxfordshire promotion. George Capes was (perhaps is still) a Director of the Bude Company, about the promotion of which we had a little to say some time since. What a strange thing that Brockenhurst has been neglected so long, when now "not less than 8 per cent. may be anticipated within a reasonable time." It ought, if this be so, to have been good for 5 per cent. some time ago.

Burden of the Rates.

Salford finds itself faced with an increase of no less than 6d. in the pound on its rates; and the prospect is one that does not prove exhilarating to the citizens. The cause is stated to be the over-spending of Committees and the decreased contributions from the various trading departments; the over-spending having amounted to £11,598, and the falling off to £5204—a deficiency of no less than £16,802. The progress that has been made on this unpleasant path of rate increase will be seen from a remark by the Mayor that seventeen years ago—the first complete year after the amalgamation of the three districts of the borough—the total municipal rates were 3s. 11d. in the pound; whereas now they have "touched the record figure" of 7s. The citizens will be likely to heartily agree with the Mayor's exclamation—"Surely we cannot go on at this pace!" The increasing of the rates is obviously a course that cannot, in Salford or in any other place, go on indefinitely. There must be a limit beyond which the ratepayers cannot go in their contributions; but it is to be hoped that some means of checking ever-growing expenditure will be found before this limit is reached. It has only been by vigorous cutting down by a Special Committee of the new estimates at Salford that an increase of 9d., instead of 6d., in the rates has been avoided. Naturally, the Committees concerned complain of this pruning. But the feeling of the Council appears to be that the knife has not even yet been sharply enough applied; for an amendment has been carried referring the estimates back for further consideration. Whether the threatened sixpenny addition to the rates will in this way be obviated, remains to be seen; but some members do not seem to be very hopeful on the point. If they feel that they must go on a little longer increasing the levies, the only thing left for the Council to do is to prove to themselves and to the citizens that they are getting value for their money.

Church Lighting.

A fortnight ago in a leaderette, and again last week in the "Electric Supply Memoranda," reference was made to the question of church lighting, and the simple plan that electricians have of showing a saving on gas by substituting metallic filament lamps for flat-flame burners. Church lighting, from the point of view of profit, is not a "line" to be particularly sought after; but, if we may be excused for associating commerce with more sacred things, it is well to remember that there is an advertising value about the lighting of places of worship. A writer in one of our electrical contemporaries was the other day asking for more examples of cheap church lighting—it may be supposed, in comparison with gas lighting. The "Co-Partnership Journal" of the South Metropolitan Company quotes the lighting costs of two neighbouring parish churches in one part of their supply area. The seating capacity of one church is 800; and there are daily services. The edifice is electrically lighted throughout. The cost of illumination for the year ended Lady-day (including renewals of lamps, &c.) was, in round figures, £44. The contrast is a church with a seating capacity of 1080, also with daily services. The building is lighted by incandescent burners, and fitted with

two gas-fires, which are used on most Sundays in winter. The total cost of lighting and fires during the year (including new mantles, &c.) is about £15. The services at both churches are about the same in number and length. At the second one, the day service is a little earlier in the morning and later at night than in the first instance. A good many sixpences and smaller valued coins of the realm are required to make up the difference between these two lighting accounts. Not many churches can afford to squander £30 a year.

Some Nottingham Figures.

Supplementing the report presented to the Nottingham Corporation last week announcing a record profit for the year in connection with the gas undertaking, some figures are now available in relation to the general progress attained during the thirty-five years over which this branch of municipal enterprise has extended. In that period, no less than £691,750 has been paid in relief of the rates; £127,860 represents the amount of annuity redemption and sinking funds; £34,300 has been devoted to the repurchase of gas annuities; £24,760 has been applied to the depreciation fund; and £20,000 to gas-stove depreciation. Besides this, £107,716 has been placed to the reserve fund, £62,447 to the trading capital account, and £16,656 to renewals. Putting the matter in another way, since the gas supply has been in the hands of the Council, the total which has been forthcoming in aid of municipal burdens and in making provision for annuity redemptions and sinking fund, renewals, &c., is equal to the capital of the whole undertaking, which now stands at £1,160,382, or £10,282 more than last year. The results, when looked at in regard to the diminution in the proportion of capital to the gas sold, are of a striking character. In 1874, the capital was represented relatively as being £743 to each million cubic feet of gas sold; whereas the amount now stands at £586. Significant, also, of careful administration is the fact that the reserve fund has been increased from £23,653 to £104,515 after transferring £61,931 to renewals and £44,000 to capital.

Revocation of Patents.

In the "JOURNAL" for April 6, comment was made on recent proceedings in connection with the revocation of patents held by foreign inventors that are not adequately worked in this country. Among those revoked by the Comptroller, and mentioned in the article, were certain arc-lamp patents in which the British Westinghouse Company and Messrs. Körting and Mathiesen were concerned. The sequel has come through the Law Courts. The Company and the firm appealed; and after hearing their evidence, Mr. Justice Parker has reversed the decision of the Comptroller. There are some features about these cases that are rather peculiar; so that they cannot be taken as fair and square precedents. But his Lordship, in delivering judgment, was plain on the point that patentees must make it quite clear they are manufacturing to an adequate extent, or supply clear reasons for their failure to do so, as well as proof that no preference is being given to foreign as opposed to British industry.

The Trouble in the Coal Fields.

In referring to this matter last week, it was remarked that temporarily, at any rate, the centre of interest in the question of coal miners *v.* colliery owners seemed to have shifted from South Wales to Scotland, and this still sums up roughly the position of affairs. In spite of all doubts that had been entertained on the subject, it is now an ascertained fact that the coalmasters in Scotland are almost unanimously in favour of insisting on the claim for a reduction in the wages of the miners. In fact, with one or two small exceptions, they have all signed the agreement to this effect which will have the result of putting an end to the Conciliation Board. Should a strike or lock-out take place in South Wales, however, the price of coal will in all probability be largely affected; and this may render unnecessary the forcing of the demand for lower wages in other fields. In this event, the misfortune of Wales would be the gain of Scotland—that is, unless the somewhat improbable "national strike" became an accomplished fact. In these circumstances, it appears most probable that the Scotch owners and men may wait before taking any irretrievable step until they learn definitely what is going to happen in South Wales. There is, we learn, a great deal of confidence that a strike in the North will be averted. Meanwhile, it is reported that efforts are continuing to be made in South Wales to find a way out of the serious difficulties that have arisen upon the passing of the Eight-Hours Act. It has been arranged that the meeting of the Joint Conciliation Board which would in the ordinary course be held next Saturday, for the consideration of disputes, will now be adjourned until Monday, when, after disputes have been disposed of, the Board will further consider the position in reference to the Eight-Hours Act and the new conditions required for the working of the collieries under it. It has also been arranged that, if necessary, the Board will continue its sittings next Tuesday.

Reissued.

The prospectus about which we had a few pertinent remarks to make last week, in which applications for shares were invited in the Water and Gas Debenture and Share Investment Trust, Limited, was reissued last week. Of course, this was not done because two Baronets on the Board had failed to attract money, or because people had recognized an old concern with a past, though with a new address printed at the head of its notepaper; or because the public have any doubts as to the future of the Company—no, nothing of the kind; the prospectus was only reissued because the Directors were desirous that the public should not be disappointed by making application too late. They therefore had printed near the top of the prospectus: "KINDLY NOTE: Further applications for allotments must be received on or before Monday, the 14th of June, by the first post." That is to say, any morning up to yesterday, on the condition that they were delivered by the first post—other deliveries would not do. What eagerness there must have been to open the 2, Budge Row, letter-box yesterday morning to see how the little bit of finesse had worked. The public need not be in a hurry or be alarmed at the thought that they will be shut out of this delectable speculation. If there is any desire to share in the financing of this offspring of the 99, Cannon Street promoters, there will be ample opportunity for doing so, though application did not reach the office by the first post yesterday.

Sulphate of Ammonia in India.—Mineral oil companies and iron manufacturers who use the recovery process will be interested to learn, says the "Chemical Trade Journal," that India is likely to become a considerable consumer of sulphate of ammonia. This is in connection with the cultivation of the sugar-cane, which is being encouraged in the Bombay Presidency, where experiments for the improvement of the cultivation are in progress. The use of sulphate of ammonia as a fertilizer on cane fields has been established in the West Indies and in Japan. A statement is made that sulphate of ammonia is likely ere long to be manufactured on a considerable scale in India itself. This must presumably be from what few gas-works and blast-furnaces there are.

Endless Screen for a Water-Works Intake.—To overcome the disadvantages of the usual sliding type of screen, there has been installed in the intake chamber of the New Bedford (Mass.) water-works a screen of unusual design. According to "Engineering Record," it may be generally described as an endless belt of wire cloth passing over four rollers so placed as to cause the upper portion of the screen to travel in a horizontal direction. These rollers are of skeleton type, consisting of heads or discs carried on shafts. The upper and outer one is fitted with a ratchet, a pinion, and a gear at either end of its shaft; the ratchet being used to prevent rotation except in one direction. The intermediate rollers do not call for description. The lower roller is covered with a perforated sheet of metal forming a cylinder; the screen moves between this roller and a perforated plate on the inflow side. To keep the screen from bending or sagging, its edges are carried in endless chains of phosphor bronze. The links have split projections at right angles to the body of the link, into which projections the gauze is riveted. The links are so shaped as to form small openings between each adjacent pair; and pins on the circumference of the working roller fit into these openings—thus imparting positive motion to the screen. The chain travels in slides bolted to the original screen frames; these slides being of such shape as to hold the screen tightly in two directions. To clean the screen, it is only necessary to raise the submerged portion by means of the ratchets, and knock the detritus into a pan placed for the purpose beneath the horizontal portion. The outer or working roller is 24 inches diameter, the intermediate rollers are 12 and 9 inches, and the perforated lower one is 14 inches. The total length of the cloth is 50 feet, and its width is 64 inches. The screen was designed by Mr. A. S. Neagus, the Chief Engineer of the station, and was built by him and his assistants. He states that since its installation in December, 1908, it has given no cause whatever for complaint.

THE INSTITUTION OF GAS ENGINEERS.

ANNUAL MEETING, JUNE 15 to 17, 1909.

PRESIDENTIAL ADDRESS

OF

MR. THOMAS GLOVER, of Norwich.

Gentlemen,—The honour you have conferred upon me in electing me to fill this chair is one I deeply appreciate; and I take this opportunity of thanking you most sincerely for the confidence you have shown, and to express the earnest hope that the work of the Institution may not suffer through your choice of a President having fallen upon me.

The Late Sir George Livesey.

No President in rising to address the members of this Institution at the annual meeting could proceed without, in the first place, paying a tribute to the memory of its most distinguished member, whose passing from our midst, in October last, made such a profound impression, and left a gap it is impossible to conceive can ever be filled. His personality was unique. Although Sir George Livesey had, by the great natural gifts with which he was endowed and by strenuous toil, attained to so distinguished a position, and though he had so strong an individuality and independence of character, he was a consistent supporter of associations of gas engineers formed for the advancement and consolidation of the gas industry. He was almost invariably present at the opening meeting of our annual session, and was a frequent contributor to the proceedings of this Institution and those which preceded it. He did a great deal to raise the status of the engineer, both in the engineer's relation to his Board or Committee and in his relationship to the general public.

Having graduated through the workshops and various departments of a gas-works to the chief engineership, and afterwards to the honourable position of Chairman of his Company, he never lost touch or sympathy with those classes of employees with whom he had been associated, and never failed to inspire self-respect or to endeavour to raise the standard of life among all classes of employees. The later years of his life were chiefly devoted to advocating that "way of peace" in the relation of employer and employed which he had found to have such beneficial results in the experience of his own Companies. Although progress was slow for a time, he had the gratification before he passed away of witnessing its adoption by a number of companies, and one or two corporations; and since his death there has been a flowing tide in its favour. It may safely be assumed that Sir George Livesey would wish for no more suitable memorial than that his life's work should be remembered through the wide adoption of a co-partnership system by gas undertakings. In this connection it is gratifying to know that the Governor of the largest Gas Company in the world, the Gaslight and Coke Company, has given an influential lead, by securing the adoption of the system whereby 11,000 employees will be linked more closely in their interest and efforts with the administration and with the ordinary shareholders.

Co-Partnership Systems.

Some of the reasons for the adoption of the co-partnership system in gas-works which might have been of importance twenty years ago, it is pleasant to feel, have less weight to-day. At that time there was what might be called a "prevalent mania" on the part of gas-works employees to agitate, to threaten, and to strike. If there is a greatly reduced tendency to unrest among our employees, even at this time when other industries have been suffering severely, let us be thankful, whatever be the cause, that the public service for which we are responsible has not in recent years been disturbed or threatened by great labour agitations. There are now other reasons, however, equally weighty, for securing the hearty and unstinted co-operation of all employees. In the face of competition, which is assuming a serious aspect in some districts, a more exacting service will be demanded from us than has hitherto been the case. Improved conditions of retort-house labour, the influence of automatic and mechanical devices on the quality of men employed, together with reasonable pay and various methods adopted in some works for rewarding men for improved results, have all had their effect in raising the tone and increasing the feeling of security in that part of a works which at one time gave the greatest amount of anxiety. The exacting service of the future requires the most economical retorting practice which can be secured; but an equally imperative requirement is an alert, intelligent, and thoroughly up-to-date outdoor staff and administration. The two great facts which press with more urgency than ever in the history of our industry are the necessity for reducing the cost of manufacture without unduly raising capital charges, and, in the application of gas, increasing the efficiency by investigating and meeting the requirements of modern town life. If the co-partnership system, or any system akin to it, will have the effect of welding together all the interests necessary for harmonious working towards the success that we are all anxious to secure—and those who have experience of it heartily affirm that it does—if, in addition, it increases self-respect among our employees and gives a sense of responsibility and a feeling that they have something at stake, let us by all the means at our command support the movement first initiated on a large scale and carried to a great and successful issue by a leader in our own particular industry.

Speaking on the serious question of competition in shipbuilding, a captain of industry, and one who has become an apostle of the co-partnership system (Sir Christopher Furness), recently said: "If we wish to sustain our supremacy, to lead the lives of self-respecting Englishmen, we must doff the garb of frivolity, cease to view life as a piece of play, we must throw off our personal self-conceit and rational complacency, become earnest students of our industrial environment, we must manifest as never before initiative, zeal, energy, care, ability, industry. The best available instrument for overcoming this crisis is co-partnership. No Englishman would manifest his patriotism more profitably to his country than by securing a national conference of the leading employers in the hope that an examination of co-partnery would result in a decision to adopt it."

The Livesey Memorial Fund.

A national movement of this kind would indeed be a lasting memorial to Sir George Livesey's memory; but may we not to-day view with satisfaction the desire to establish another form of memorial which manifested itself immediately after his death? For the first time practically the whole British Gas Industry has been moved to a united effort which naturally took the form of perpetuating an endowment initiated for the development of the gas industry by the one whose memory it was desired to honour. Municipalities owning gas undertakings, some of them having their own Universities, have realized in some degree their sense of stewardship, and have joined hands with Metropolitan and Provincial gas companies. Directors of gas companies have in many cases subscribed privately. Officials of gas companies and of corporations have responded to the call, as have also gas contractors. All who have taken part will be gratified that the amount of £10,000 (the sum we set out to raise) has been almost subscribed, and they will not regret the effort has been made. What is to be the outcome of all this effort? Subscribers to the fund, by the act of subscribing, have expressed a belief in some gain to the gas industry to be derived by the co-operation of a University Department devoting itself to the investigation of problems affecting the methods of manufacture and the applications of gas, and to the teaching of applied science to students whose careers are intended to be spent in the service of the industry.

Time alone will show if that belief be well founded; and its realization will depend not only upon the University authorities, its teaching staff, and its advisory committee, but

upon the parents and guardians of students and of the students themselves making use to the full extent of the opportunities which this special department of the University will present. Can anyone doubt that the industry will gain by the better scientific equipment of those intended to take responsible positions in its service? Does not the work of our Junior Associations give distinct evidence that the better technical training now given by our schools and colleges is having a beneficial effect in developing young men of scientific attainments, whose services to the undertakings to which they are attached are, by that training, raised in value and usefulness? The endowed professorship devoting its energies to carrying out research, and to the teaching of applied sciences, should greatly benefit all young men who are privileged to take the course of instruction specially adapted to the needs of the gas industry; and, in addition, the University will, we hope, from time to time, turn out men of exceptional ability, who will be trained to the highest pitch in the special knowledge relating to their future calling.

There may not be at present a demand for many experts on the scientific side of the industry; but there are evidences of an increasing disposition to call in the help of those who, by their special training, are able to unravel mysteries and to give advice upon questions connected with new methods of manufacture. But the greatest value to be derived from the new University Department will probably be through an indirect influence upon the whole industry rather than by direct and visible productivity. Those who have a knowledge of such institutions expect the more lasting and permanent results to be created by way of an atmosphere of scientific principles in the industry; the fact of its "being there" making itself felt in all departments concerned. There will be, we trust, a constant interchange of scientific knowledge and practical experience between the University and the factory. The scientist and the practical engineer being brought together, their frequent contact cannot fail to be mutually beneficial. The scientist will become acquainted with the demands of the industry, and can turn his researches in the direction of probable utility; the technical man will gather knowledge that may enable him to steer a clearer course than the winding ways of unscientific procedure would afford him. In various ways, therefore, we hope and believe the new venture will bear fruit. But it may not be seen immediately; subscribers may need to wait patiently for visible results. They may, however, cherish the comfortable feeling that good foundations have been laid on which a worthy superstructure will ultimately arise.

Training of Gas Engineers.

In this connection, I have a contribution from the pen of Dr. Bunte, who has kindly sent some valuable information from his experience in the training of gas engineers in the Technical School at Carlsruhe. The course of training is three-fold: (1) The complete chemical training of gas engineers. (2) The continued training of mechanical engineers directed towards the chemistry and physics of gas manufacture and supply. (3) The continued training, by means of holiday courses, of older gas engineers who are already in practice. Dr. Bunte believes that the development of the gas industry undoubtedly requires that greater emphasis should be placed on the chemical and physical training of those intended to take responsible positions.

A scheme has been embodied in the curriculum of the Technical School at Carlsruhe which includes lectures and practical work. To obtain the honour of an Engineering Diploma, the students attend a regular course of lectures, and not only pass a *vivâ voce* examination in the main branches of their study, but also submit a thesis on the simple investigation of a question which has been put to them by the Director of the Laboratory. By this means an opportunity is given of training the students in the habit of independent thought and of examining their readiness in the handling of scientific problems of a technical nature.

This more or less independent analysis or working at a given question, Dr. Bunte goes on to say, is carried to a still greater extent in a more advanced course of study, where the student wishes to obtain the honour of a Doctor's Degree in Engineering, an experience which frequently occurs in their chemical division. By this organization of instruction, abundant opportunities are given both to the teacher and student for working at technically important questions, and as in the later professional life of the practical man, with the rapid progress of technical knowledge, more or less the same problems of independent solution of technical questions present themselves, this training by the teacher is of special value for the future member of a technical profession.

We have Dr. Bunte's testimony that in the last ten years a number of students have continuously taken part in this training, and these students have been very readily accepted as assistants in gas-works and in establishments for the manufacture of coke.

While we thus magnify—and under the circumstances it may be excusable to do so—the importance of the part which scientific training will in the future hold in the preparation of men for controlling and guiding the manufacturing processes connected with gas manufacture, it would be foolish to think that the University course will supplant, or even diminish, the importance of the practical training in the industry itself. The man who is likely to take charge of even a moderately large concern should be equipped with all knowledge and ability modern teaching can give; but the power to organize, and the delicate tact required for controlling employees, as well as the wisdom which directs means to right ends, can only be learned under the guidance of an experienced engineer and manager, directing the various departments of a modern gas undertaking. After all, college training is a means to an end; and it may be of little value if the student is not blessed with a fair measure of native British shrewdness, a sense of proportion, and high personal qualities which make up what we designate as "character."

Carbonization.

It is time, however, to get away from these tempting topics and briefly examine the questions of the day now uppermost in our minds. First of all comes carbonization—a subject which is in such a condition of flux that it is difficult to touch upon it under the limitations of an address from the chair without trespassing unduly on controversial ground. The rapid development of the Dessau system of vertical retorts, together with the significant adaptation of the coke-oven system of carbonization now being installed in many Continental gas-works, shows at least a determination on the part of gas engineers to break with the older systems. In this country, progress has not been so rapid; but there are no doubt good reasons to explain our comparative slowness. The revival of the idea of using retorts set vertically appears to have been linked, in this country, from the commencement of the revival with the high ideal of accomplishing by their means continuous carbonization. This was so with the Settle-Padfield arrangement; and although its development was arrested, the germ of continuous carbonization was there, and it was sufficient to inspire latent ambitions and hopes in several directions.

The existence of magnificent installations of continuously worked vertical shale retorts in Scotland, the conception of British chemists and engineers, is quite sufficient to account for the determination of British gas engineers not to be content with intermittently worked verticals, but to go at one stroke for the more perfect system. High ideals are usually difficult of attainment; but evidence is not wanting to show that substantial progress has been made, and the pioneers who are now successfully emerging from their difficult tasks are deserving of our sincere appreciation and congratulations. Provided there are no unforeseen collateral disadvantages to outweigh the many obvious advantages attached to the continuous system, the outcome promises to be not unworthy of the best traditions of British conception and initiative. Much of our knowledge is only gained by empirical procedure; but the chemist will come to the aid of the engineer, and together they will reason from the results obtained in any new form of plant whether the conditions are favourable or unfavourable for the conversion of coal into the greatest value of products.

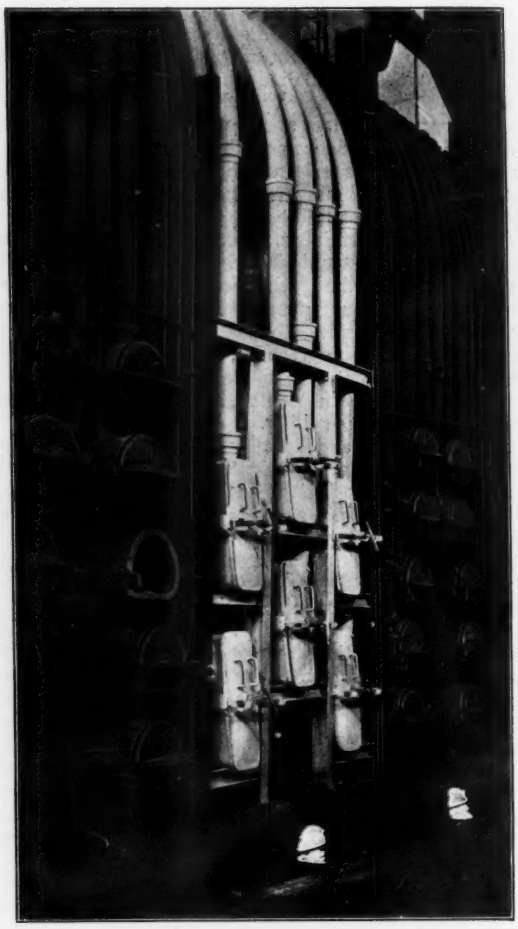
The forms of plant which will ultimately survive are those which will give the greatest value in products, of the quality to suit local conditions, accompanied by the lowest total expenditure on fuel for heating, labour for operating, and interest on capital expended. The large number of engineers who have adopted the Dessau vertical system on the Continent must have assured themselves that this system is able to give better returns, after providing for the additional outlay, than the older systems either displaced or supplemented; and those British engineers who had the privilege of witnessing the perfection of detail in construction, and the smoothness of the operations, at the Oberspree works of the Imperial Continental Gas Association last summer, and who likewise have read the able contributions made to our technical literature on the subject by Herr Körting and

others, will have no hesitation in agreeing that the assurance is well founded.

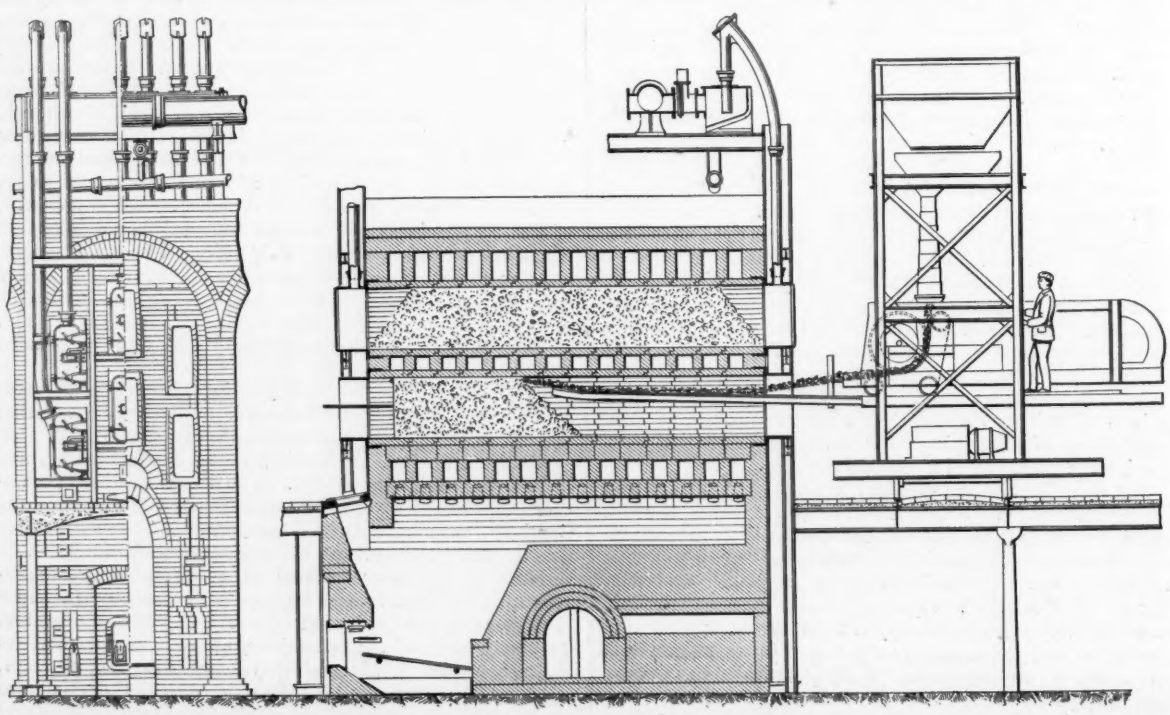
But side by side with the rapid adoption of the Dessau vertical system there has been the adoption, in other Continental works, of the carbonizing chamber system; and the engineers who have installed chambers in preference to verticals must have some good reason for believing that chambers, for their local conditions, would yield the better return. However much doubt there may have been in the past as to the feasibility of advantageously carbonizing in bulk where gas is the primary product, those doubts must give way to faith when we hear not only of the Munich chambers being installed in various works, but also that notable constructing firms have installed the chamber system in Königsberg, Bochum, Vienna, Rotterdam, Padua, Zwickau, Rixdorf, Berlin, and Frankenthal.

There is a significance about the newest departure in carbonizing in Continental gas-works which can only be understood in connection with an equally significant movement among the coke-makers of the coal and iron districts of this country. For the production of metallurgical coke, about 18 million tons of coal are annually used, as against 15 millions in British gas-works. Of this 18 million tons used in coke-works, only $3\frac{1}{2}$ million tons are at present carbonized in recovery ovens. But the prejudice against the recovery oven coke is rapidly passing away; and it is suggested that the construction of recovery ovens will go on at an accelerated rate until the old, wasteful bee-hive ovens are finally superseded. We may therefore look forward to the tar and ammonia products from an additional $14\frac{1}{2}$ million tons of coal being put on the market to compete with the increasing output from gas-works. It is difficult to imagine this being done without its having a disastrous effect on the markets for these products; and this effect will be felt in the revenue account of all gas undertakings. But besides the tar and ammonia products, the whole of the patent oven coke does not find its way to the iron-works. For some purposes, even in the Eastern Counties, gas coke is being displaced by oven coke; and in the coal and iron districts the surplus gas is being used for the production of electric energy, and this, in its turn, competes with the form of energy our works are established to supply.

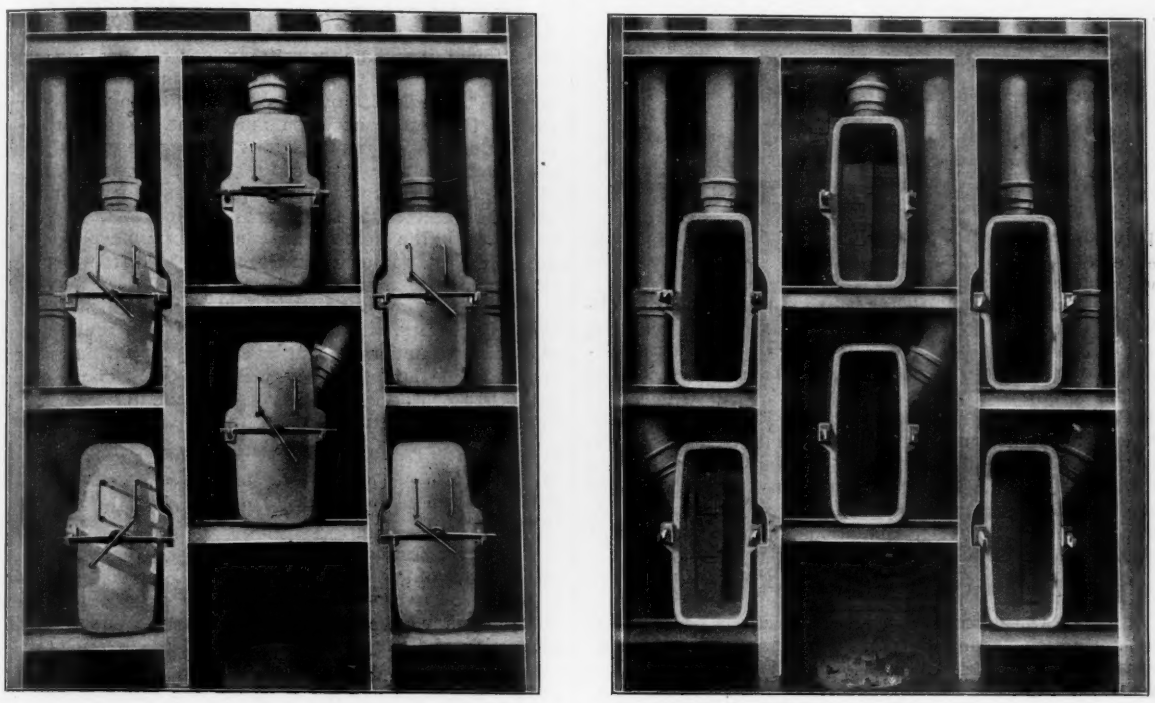
The use of carbonizing chambers in our large gas-works similar in size and shape to the recovery ovens, constructed on the inclined principle like the Munich chambers or horizontally as at Rotterdam, will do something to check this undesirable competition. The promoters of the carbonizing chamber system claim that by their use, as compared with ordinary retorts, there is a higher yield of both gas and bye-products, a great reduction in operating costs (which we can readily understand), and the production of high-class coke suitable for all metallurgical purposes. If these claims are confirmed by the Continental undertakings now using them, if the chambers are good gas makers, as well as good coke makers, will it not be a wise policy for our large works—particularly in the coal and iron districts—to discontinue making great quantities of ordinary low-priced gas coke? To make a better article and realize a higher price, to do something to prevent the threatened flooding



The Glover Three-Feet Deep Retorts at Norwich.



The Charging Arrangements for the Glover Three-Feet Retort-Setting at the Norwich Gas-Works.



The Glover Three-Feet Deep Retorts at Norwich.

of the market with surplus products for which there is no present prospect of an adequate outlet, to conduct the carbonizing operations at a low cost and obtain good gas results—these things seem worthy of the attention of our great gas undertakings. Hitherto coke making in gas-works has not received the attention the return it can be made to yield deserves.

The improved methods of carbonizing now coming into use, together with a commercial awakening in the methods adopted for advantageously disposing of it, will result, I venture to think, in making us give more attention to adapting our methods of manufacture to the production of a quality or qualities to meet the local demand for various purposes. Mention has been made of the fact that recovery oven coke is displacing gas coke in the Eastern Counties. This refers particularly to the coke used for forcing fruit. A good proportion of the Norwich make, besides a considerable quantity brought by rail from the Midlands, is used for this purpose. The fruit growers have found that, by providing somewhat larger furnaces and using a keener draught, hard coke can be employed to greater advantage than ordinary gas coke. The desired temperature is kept up with greater reliability, particularly during the cold nights of early spring.

The Three-Feet Deep Retorts at Norwich.

To enable the Norwich works to meet this demand for a harder and denser coke, the Board under whom I have the privilege to serve sanctioned the trial of a setting of small chambers; and this was worked with such promising results that two additional settings are now being constructed. The setting has been adapted to suit existing arches ordinarily used for ten Ω retorts. A somewhat better disposition of the chambers can be made when the main arches are built for the chamber settings. Each chamber measures 36 in. high by 12 in. to 13 in. wide and 21 ft. long. The sides, when built, are slightly cambered, to allow for lateral expansion of the brickwork and to prevent the expansion narrowing the inside measurements between the walls. The tops and bottoms are formed of rebated tiles 4 inches thick, and the sides are built of specially-shaped tongued bricks breaking-joint on the supporting walls. The sides exposed to the highest temperature in the setting are protected with silica shields. All the fire-brick material was carefully selected. Each chamber was fitted with a socket mouthpiece, and luted doors were used in the first trial setting. Specially designed self-sealing mouthpieces and doors are fitted to the additional settings.

To charge these chambers it was necessary to make an addition to the De Brouwer projector. This was carefully worked out by Messrs. W. J. Jenkins and Co., and consists of a mechanically driven plate, which is inserted into the chamber for 15 feet at a distance of about 2 feet from the bottom. The plate is slightly curved upward at the end. The projected coal skids along the surface of the plate, takes a leap upward, piles up against the temporary stopper, and completely fills the chamber except at the ends, where it is allowed to assume its own angle of repose. The plate is slowly withdrawn as the chamber is filled. Each chamber holds 21 cwt.; and the coke from this quantity of coal is pushed out with the same ease as the coke from an 8 cwt. charge. We find twelve-hour periods are best suited to the working of the chambers. The coke fractures vertically down the centre, and when it falls on to the conveyor, is in large pieces having the appearance of the coke from the recovery ovens. Particulars of the results obtained from these and other chamber settings will be found in the Carbonizing Committee's report, and in the paper to be presented by Dr. Lessing.

The construction and working of these small chamber settings may seem a puny effort compared with the bold constructions and operations in Germany; but it has to be remembered that where the plant is sufficient for some years to come, as is the case in the Norwich works, it would not be prudent, even if it were possible, to embark on a large expenditure on additional plant. No British gas engineer is likely to overlook the importance of keeping down capital expenditure. It is sometimes possible to modernize on a moderate scale out of revenue. This was the object in adopting the chamber system to an existing bench; and the size of the chambers has proved to be quite suited to the requirements of the works, and they produce the quality of coke needed to meet the local demand.

The gas results confirm those claimed for the larger chambers used on the Continent. Makes of over 12,000 cubic feet per ton are obtained without difficulty, using South Yorkshire washed pea nuts. Only when excessive temperatures are used is there any trouble with stopped pipes; the free carbon appears to be filtered out by the coke. The number of operations in charging and discharging being much reduced as compared with ordinary retorts, the labour costs in working this system will be low. Sufficient has been learned from the use of these small chambers to encourage the belief that there is nothing to fear in adopting larger chambers where massive coke would fetch a high price, and where the size of the units would correspond with the capacity of the works, and not be unwieldy for meeting a varying demand for gas. It is very interesting to observe that the rate of

carbonization proceeds more rapidly with narrow than with wide ovens.

With ovens 12 inches wide carbonization proceeds at an average rate of 0·500 inch per hour from each side.

With ovens 16 inches wide carbonization proceeds at an average rate of 0·470 inch per hour from each side.

With ovens 17 inches wide carbonization proceeds at an average rate of 0·425 inch per hour from each side.

With ovens 20¾ inches wide carbonization proceeds at an average rate of 0·305 inch per hour from each side.

It would be bad practice to force the speed by the use of excessive temperatures. The percentage of fuel used rises when this is attempted.

If it is a rational ambition that, as far as possible, all high-temperature coke, even that used in the metal industries, should be produced by the works owned by the gas undertakings of this country, it cannot be foolish to suggest that if there is to be a demand for a homogeneous, low temperature coke, like the "Coalite" Company's brand, gas-works are the only fit and proper works for the production of such an article. Gas undertakings can distribute and sell to best advantage the gas made during the production of either hard metallic coke, freed from volatile matter, or porous material suited for the domestic hearth and containing 10 per cent. of volatile matter.

The Provision of Smokeless Fuel.

It will be readily conceded, I think, that one result of our meeting together annually, as we do to-day, is to give members of the Institution broader views of the work the gas industry has to do in the service of the public. In the past, as in the present, its chief service has been to provide light; and we hope that this may be so for many years to come. The importance of that part of our business and work must not be underestimated; but is it not apparent that in the future we shall be called upon to take no mean part in providing smokeless fuel both gaseous and solid?

The movement for the abolition of the smoke nuisance, as it is called, is gathering strength; and the part the domestic chimney plays in creating the nuisance has now begun to be recognized. It is unbelievable that the inhabitants of our large towns and cities will go on for ever using rich bituminous coal in such a way as to heavily charge the atmosphere they have to breathe with the products of distillation. I do not hesitate to say that it would be a blessing to our people from a sanitary point of view, which might come to be appreciated, if a courageous Chancellor of the Exchequer, casting round for a new basis of taxation, were to seize upon bituminous coal, and so tax all consumers of it (except gas undertakings) as to compel a preference for smokeless fuel. A too plentiful supply of the mineral has resulted in its use by methods truly described as "barbaric," both for manufacturing and domestic purposes. Manufacturers are rapidly reforming and finding that complete combustion pays. The domestic fire-place is a more difficult question.

Taking London as the greatest city, and the one most plagued with smoke fogs, we find that it is estimated that there are nearly half-a-million gas cooking-stoves in use; but the relief to the smoke-charged atmosphere by their use on a late autumn or winter morning is unappreciable, because of the millions of apartments which must be warmed by having fires lighted by unscientific hands, in cold grates, and by the use of bituminous coal. Look from a hotel window, or from an elevated railway over London, and gauge the extent of the problem. It will be obvious that, when public opinion has become educated sufficiently and the remedy is at hand, the demand for a smokeless fuel must be enormous. What is true of London is true also of the Provincial cities and towns.

The City of Norwich is fondly called by its inhabitants the "City of Gardens." It is provided with numerous open-air spaces and has an abundance of trees and gardens. The factories obtain their power, for the most part, from gas-engines and electric motors. In the 25,000 inhabited houses are fixed close on 20,000 cooking-stoves. Gas-fires and other heating appliances are being fixed at about the rate of 800 to 1000 per year. In the summer, the city is comparatively free from smoke; but on an autumn or a winter morning, the smoke may be met at a distance of three miles from the city boundary, and in the lower parts of the city the atmosphere would be so charged with the products of distillation as to be almost unbreathable.

The loss of sunlight, the ill-effects on health, the damage to buildings, both ancient and modern, the dirt and squalor of our towns constitute part only of the price the public have to pay for using fuel the wrong way. If a remedy is to be found, it will be through our gas undertakings which already, by their enterprise, have done much more than has been given credit for by those who are taking a prominent part in the smoke abolition movement. Taking the estimated quantity of gas used for fuel purposes, together with the quantity of coke produced for sale, the gas undertakings of the United Kingdom are providing the public with smokeless fuel equal to about 7¾ million tons of coal per annum. By the help of an educated public opinion, the quantity of both kinds of fuel to be supplied from gas-works will be greatly increased.

From some interesting tables recently published by Mr. W. J. Carpenter, of Great Yarmouth, I find that the ratio of day consumption in that town to the total annual consumption in the year 1887 was 27·85 per cent., against 45·01 per cent. in 1907. For the summer months, the increased ratio is still more striking.

In June,	1887, the ratio was	20·54	per cent. against			50·42	per cent. in 1907.	
In July,	,,	,,	19·98	,,	,,	50·96	,,	,,
In August,	,,	,,	16·07	,,	,,	47·53	,,	,,
In September,	,,	,,	14·78	,,	,,	41·94	,,	,,

This is interesting evidence, from a seaside resort, of the growing use of gas for fuel purposes. I am unable to make a similar comparison for Norwich over the same period; but as it may have been observed that an unusually high proportion of the gas consumers of Norwich are provided with cooking-stoves, and as everything is done to popularize the use of gas for lighting purposes, the ratios of day consumption to the total are of interest.

Monthly and Yearly Ratios of Day Consumption to Total Consumption.

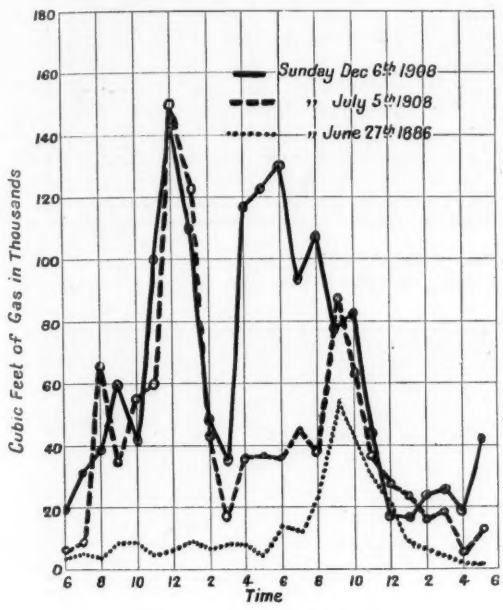
—	1905.	1906.	1907.	1908.
Total gas sold and	473,204	499,846	528,190	542,866
Day ratios to same	49·9	49·5	49·9	50·8
January	50·2	51·4	52·4	53·2
February	47·6	47·8	48·1	48·4
March	42·3	43·7	41·9	45 5
April	45·1	44·6	45·36	46·5
May	50·4	51·7	50·82	52·7
June	55·1	54·6	55·4	54·9
July	55·7	55·3	55·3	55·2
August	52·1	50·3	51·1	51·9
September	45·8	46·4	47·1	46·9
October	45·5	43·4	46·9	47·5
November	51·1	50·4	51·2	51·8
December	52·7	52·5	53·5	54·6

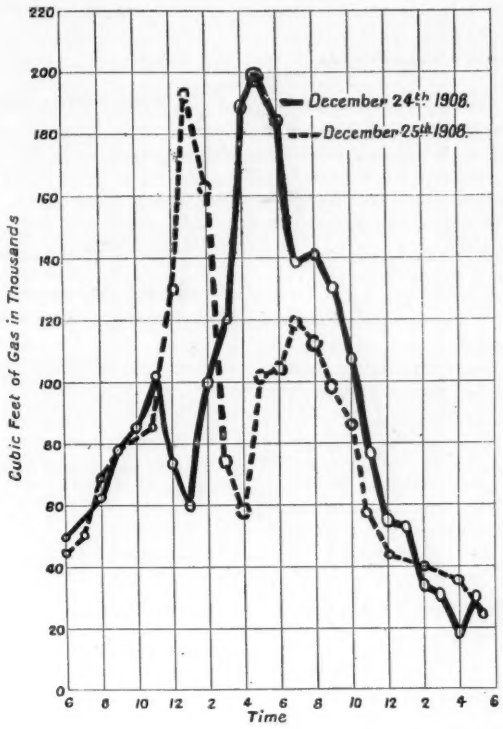
We may safely assume from the above figures that, so far as Norwich is representative, only about 50 per cent. of the gas is used for producing light; and of this 50 per cent. only about 10 per cent. is now used in luminous flames. Hence the declining importance of the photometer for ascertaining the value of a gas to the average consumer.

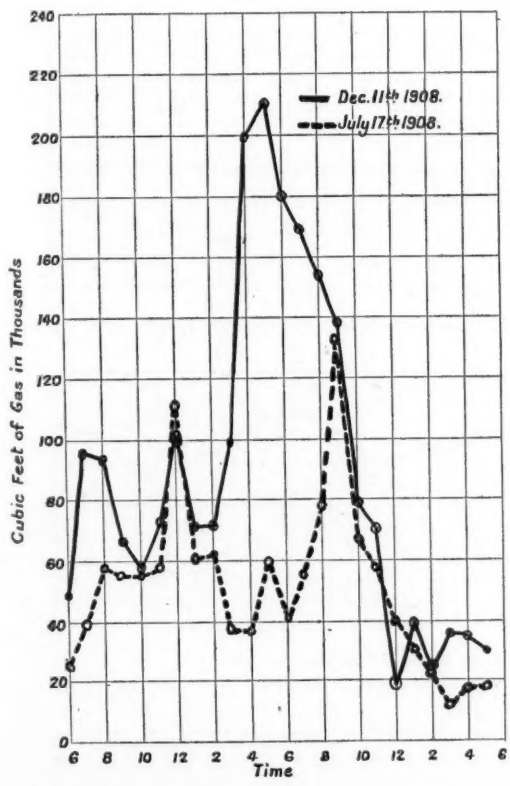
The disparity in the illuminating power and calorific tests made on gas produced in vertical retorts also points to the necessity for a change in the authorized standards. The freedom from photometrical testing enjoyed by German gas undertakings has favoured the adoption of the vertical retort and chamber systems of carbonization. The retention in this country of tests, the value of which is now rapidly becoming *nil*, will hinder developments in carbonizing. We may, therefore, regard with satisfaction the acceptance by the Gaslight and Coke Company of a clause in their new Bill imposing a calorific test, and look forward with hope to the time when tests for illuminating power will be entirely superseded.

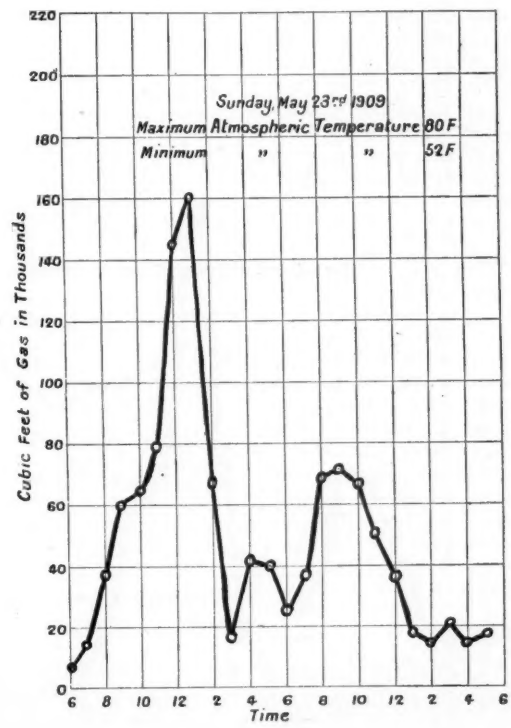
As to the limits imposed and accepted by the calorific test, it has since been stated that 125 calories per foot of gas would constitute a standard higher than can be maintained where the illuminating power is 14 candles tested with a No. 2 "Metropolitan" burner, and where a mixture of coal gas and carburetted water gas is supplied. In most works, however, there will be no difficulty in complying with such a standard; and the freedom allowed by such a test would be welcomed by many gas engineers who are now obliged to comply with stringent illuminating power regulations.

The diagrams further illustrate the important place the fuel business is taking; and the lessons to be drawn from them need little amplification to a body of gas engineers.









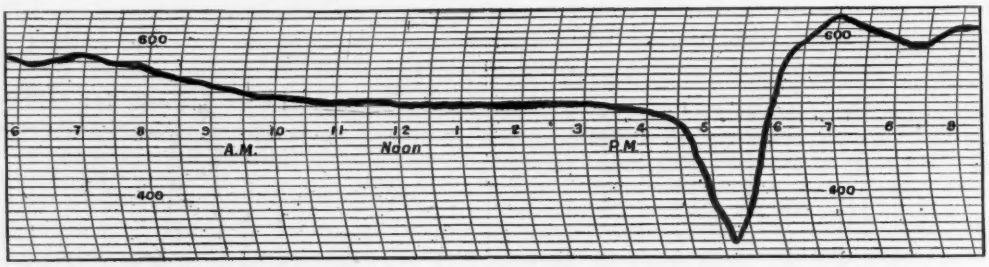
They simply indicate what is taking place in a greater or less degree in the experience of every progressive gas undertaking.

The Institution has recognized the important place gas for heating is capable of taking by appointing a Committee to conduct investigation and research in conjunction with a Department of the Leeds University. The report to be presented during the present meetings will indicate the progress already made. It is to be hoped that the financial support of boards of directors and committees of municipal undertakings may be continued, so as to enable this and other investigation work for the good of the industry to be pursued. It must be remembered that anything which contributes to the success of gas-heating is contributing materially to the reduction of the smoke nuisance.

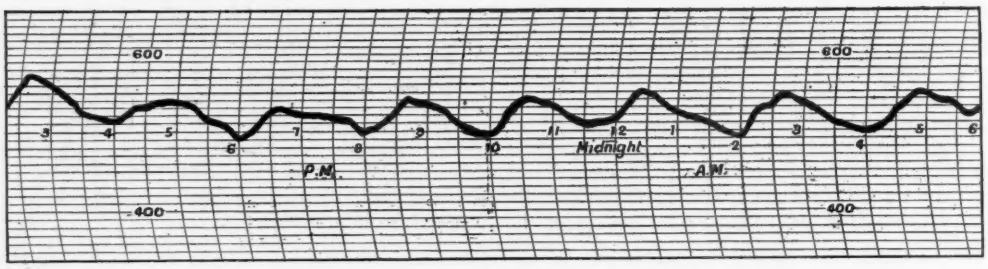
Household Heating.

Although we may legitimately claim that the gas industry is adapting itself to the new service required of it, and is showing its faith in the future use of gas as a fuel by spending capital freely on appliances which consumers can either hire or acquire on easy terms, and although we believe that in so doing a substantial advance has been made in the solution of the smoke nuisance problem, few gas men are so sanguine as Sir Oliver Lodge, who, from a recent address delivered at Sheffield, appears to anticipate that the whole of the fuel requirements of a model town can be supplied through gas-mains.

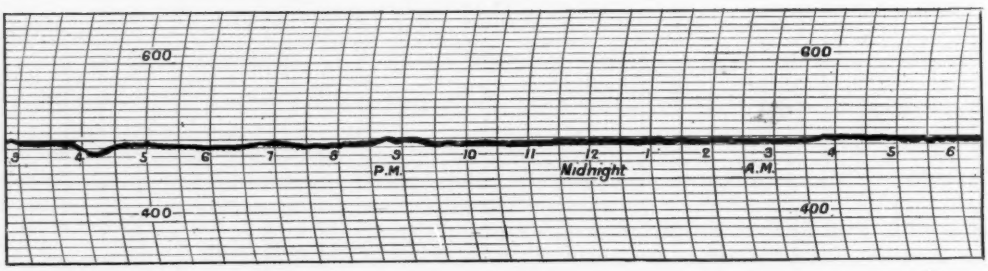
For many purposes coke will remain the cheaper and the better fuel; but with coke the conditions have to be fitted to the fuel, and something more can be done in this direction than has been done in this country in the past. The Coalite Company's scheme, however, recognizes that the suppression of the open fire-grate will be a slow process; and they therefore propose to fit the fuel to existing conditions retained with such tenacity by the British householder. Along these lines



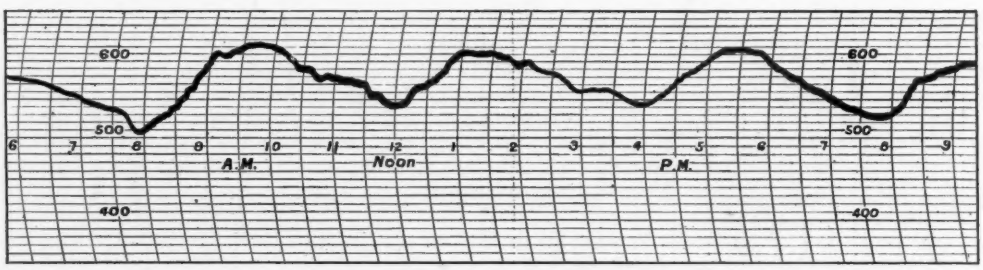
Recording Calorimeter Chart—Coal Gas. Outlet of Purifiers.
Showing the Effect of Stopping on Sunday Morning and Starting on Sunday Evening, Nov. 16, 1908.



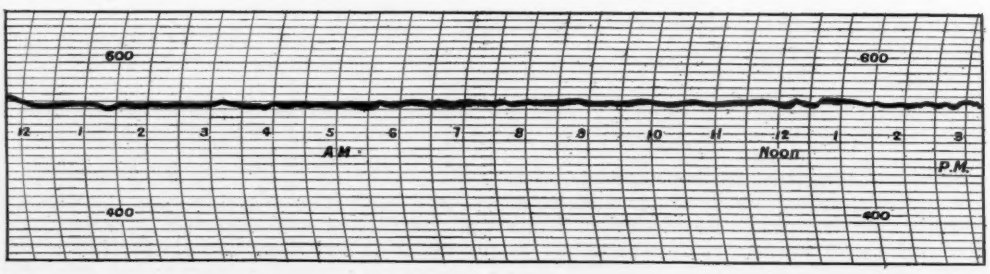
Recording Calorimeter Chart—Coal Gas. Outlet of Purifiers.
Six-Hour Charges. Normal Working. April 1 to 2, 1909.



Recording Calorimeter Chart—Carburetted Water Gas. Outlet of Purifiers. May 13 to 14, 1909.



Recording Calorimeter Chart—Coal Gas. Outlet of Purifiers.
Showing Eight-Hour Charges. Normal Working. April 21 to 22, 1909.



Recording Calorimeter Chart—Outlet of District Governors—June 5, 1909.

lies abundance of scope for the gas engineer of the present and the future.

The Coalite Process.

It is claimed by the promoters of "Coalite" that it is a free burning, smokeless fuel which will compete in the market, not with gas coke, but with high-class coal for use in open fire-grates. The coal for its manufacture is distilled in groups of iron tubes, tapering from $5\frac{1}{4}$ in. to $4\frac{1}{2}$ in., set vertically, at a temperature of 800° Fahr. During distillation about 5000 cubic feet of gas, 20 gallons of tar, and liquor equivalent to 15 lbs. of sulphate are produced. The plant erected on land adjoining the Plymouth Gas Company's works appears to be a marvel of completeness for carrying on the process economically. The distilling vessels being

so small and the temperature required for the process being so low, compared with our practice, the fuel used is said to be only about 6 per cent. of the weight of the "Coalite" produced, and the wear and tear on the settings is reduced to a minimum.

By distilling the coal at the temperature used, the gases evolved are not subject to secondary reactions, the sulphur contents in the purified gas is favourably affected, the thin tars, when distilled, give an unusually large proportion of light spirit (said to be valuable for internal combustion engines), heavy oils free from naphthalene, and pitch innocent of free carbon. In a comparison of manufacturing costs published in "The Times," the gas into the holder from the process is figured out at 4·66d. per 1000 cubic feet. The gas is said to have a heating value of 750 B.Th.U., and to have an illuminating power of 20 candles.

The departure from our ordinary retorting practice is so revolutionary, and the methods of exploiting have been so bold, it is not to be wondered at if the claims have been received with a certain amount of scepticism. The working of the plant at Plymouth, however, puts the proposition on to a different footing; and it is evident that, as gas-makers no less than as smokeless fuel providers, we cannot afford to neglect an examination of its claims. It may be that the Coalite process will become an auxiliary to the older system, and that it is destined to extend the sphere of public usefulness rendered by gas undertakings.

Tar for Roads.

If an improvement of the atmosphere brought about by extended enterprise on our part be a matter of agreeable reflection and anticipation, we may view with similar satisfaction the use of tar in the construction of more sanitary roads. The benefits derived from the painting of road surfaces with suitably prepared tar are now well understood by most road engineers and surveyors. Not only is the dust nuisance overcome, but the life of the road is prolonged. Mr. Maybury, the Kent County Surveyor, estimates that the main roads of England and Wales, if painted annually, will absorb about one-fourth of the present production of tar in the United Kingdom. This new outlet will have a beneficial effect on the receipts for this bye-product; and its use should be encouraged.

The tar best suited for road-painting must be freed by distillation from water, naphthas, and light oils. The plant required consists of a still of a capacity to suit the size of the works, a condensing worm proportioned to the size of the still, a separating tank, and storage tanks for the condensed products. It is advisable to provide a tank also for the storage of the prepared tar, as it is not always either convenient or safe to run the tar direct from the still into the contractor's tanks or barrels. The uncondensable products from the condensing worm must be passed through a purifier, and the plant must be registered with the Alkali Inspector. Tar prepared in a plant recently erected for the purpose is now being used on a large scale in Norwich, and, mixed with certain ingredients is also being used for making "Tarvia" matrix in connection with the Gladwell system of road construction.

Sulphate of Ammonia Production.

In an earlier part of this address I have drawn attention to an expected increase in the quantity of products from the distillation of coal due to the adoption of recovery ovens for the production of metallurgical coke. The new outlet for tar will do something to neutralize the effect so far as this product is concerned; and it is a fortunate circumstance at this juncture that so much tar is likely to be diverted to the improvement of roads. There is, however, no immediate promise of an equally good outlet for the anticipated increased yield of ammonia products; but the position is not entirely without its hopeful side. The annual production in Germany has grown since 1896 from 35,000 tons to 313,000 tons in 1908—an increase in twelve years of 278,000 tons. In the United Kingdom during the same period, the increase in the annual production has been 123,000 tons. The demand for home consumption during the twelve years has increased from 45,000 to 80,000 tons per annum; so that while our own country has absorbed an additional 35,000 tons per annum, foreign countries are taking an additional 366,000 tons of British and German made sulphate.

The Sulphate of Ammonia Committee, of London, have done much useful and effective work in the British Isles among agriculturists and horticulturists, and have, no doubt, stimulated the home demand. The Committee now propose to join hands with a Continental combination of producers with a view to propaganda work in countries such as Egypt, South Africa, India, and China, where as yet little or no sulphate is used. By such extended work, as well as by the efforts of individual traders, it is expected that something may be done to make the demand keep pace with the increasing production, and so prevent prices from dropping to a low level. To enable British-made sulphate to hold its own in foreign markets, it would appear necessary for more care to be bestowed in getting the sulphate into condition, and for bags of a better quality to be used. The warning issued by the Board of Trade, if heeded in time, may prevent the loss of a valuable market to British producers.

The Competition of Electricity.

Before bringing this address to a conclusion, I should like to revert to the diagrams of hourly gas consumption. If they reveal an important demand for other purposes than that of producing light, they also show how much we run the risk of losing if every care is not taken to satisfy the requirements of consumers as to their lighting arrangements. Hitherto convenience and cleanliness have favoured electricity; while relative cheapness has weighed with the prudent in favour of gas. The metallic filament lamp has done something to reduce the costliness of electricity; but corresponding improvements have enabled us to supply a greatly improved light with better facilities for turning on and off, and at the same time stained ceilings and over-heated rooms are practically things of the past where well-made and properly adjusted inverted burners are used.

With a duty of 20 to 30 candles per foot of gas for ordinary pressure, and 60 candles upwards per foot for high pressure supply, the days of gas lighting are not yet over. But our competitors are vigorous and active, and their artistic fittings place our unattractive brackets and chandeliers, the heritage of a hundred years of gas lighting, at a great disadvantage. To satisfy the educated taste of consumers, is it not important that artistic fittings should be supplied on easy terms, and so give our new forms of gas lighting a real chance? In the same way I believe that all better-class slot installations should be made models and examples to be copied by others. In such an installation the supply will be governed at the meter; the piping of the house will be sound and good; and the fittings will be light and artistic in design. Inverted burners will be used in the best rooms; and, if possible, maintenance of the mantles and burners, under certain conditions, will be undertaken.

Our electrical competitors have led the way in devising new and ingenious methods of charging for the energy they supply, and have frequently the advantage where rigid methods of charging for gas are adhered to. To compete for outside shop lighting it has been found necessary to quote an inclusive annual charge for a given candle power over a number of lighting hours. The annual charge includes the hire of lamps, maintenance, cleaning, lighting, and extinguishing. The cost of the latter may be obviated by the use of an hourly meter to register the number of hours the lamps are in use. This class of lighting business is well worth cultivating, as it keeps the capabilities of gas lighting before the public.

Conclusion.

The interests of gas engineering are manifold. There are many subjects of interest that I have not attempted to discuss. As far as possible I have endeavoured to review some of the larger questions destined to shape the future of the industry and have avoided the small concerns and duties which go to make up the daily round. When the time returns for these, we will (in the words of Robert Louis Stevenson) ask the help to perform them with laughter and kind faces, and try to let cheerfulness abound with industry. May we go blithely to our business all the day, and come to our resting-places weary and contented and undishonoured.

Gas Undertakings Returns for 1907-8.—The returns relating to the gas undertakings of the United Kingdom for the year ending Dec. 31, 1907, in the case of the companies, and March 31, 1908, in that of the local authorities, which were ordered on the 31st of July last, were presented to the House of Commons on Friday, and ordered to be printed. Unless, however, there is greater expedition in their production than has been displayed of late years, it will be some months before the returns will be issued as Parliamentary Papers.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 746.)

THERE was immense activity in the Stock Exchange last week; but it was nearly all concentrated in one market. While some of the leading departments were persistently quiet, with a dull, or at best uneven, tendency, the South African Market was enjoying a boom; and many mines in other lands were in great favour. It was settlement week, and the operation was extremely heavy, finding full employment for all available hands. After a quiet opening on Monday, things took a firm tone generally; but Railways were quite out of it, and the Foreign Market was heavy. On Tuesday, the tendency was mostly rather dull, excluding the popular lines already noted above; but Consols held on unchanged. Wednesday was worse for the gilt-edged class. Consols fell $\frac{5}{16}$; while realizations administered a check to South Africans. Railways had a welcome turn for the better. Thursday was an in-and-out sort of day, with irregular movements past classifying; but things looked firmer at the close. It was not a good day for gas; the two chief issues having a fall. On Friday, the tendency was again uneven; but Railways continued to improve. Consols went down and then up again; and the Foreign Market was weak. On Saturday, there was a calm after the turmoil of the settlement. The speculative lines were not quite so buoyant, but the less emotional markets were pretty good. In the Money Market, there was a strong demand, the requirements of the Stock Exchange being very heavy; and rates rose accordingly. Terms for discount were firm. Business in the Gas Market was fairly abundant on the whole; but it was concentrated in fewer issues than ordinarily. Movements were somewhat irregular; for while Gaslight and Coke and South Metropolitan both had slight falls, many other issues had rises, reaching in some instances to 3 and 4 per cent. Gaslight ordinary opened at 104½, and afterwards touched 104½; but the closing transaction was at 103⅜—a fall of ½. In the secured issues, the maximum realized from 88½ to 89, the preference from 105 to 105¾, and the debenture 86 and 86¼ *cum div.*, and 84¾ *ex div.* South Metropolitan was quiet, and changed hands at from 122½ to 123½ (a fall of 1); and the debenture made from 85 to 85⅞. In Commercials, the 4 per cent. was done at 109½, and the 3½ per cent. at 103½ and 103⅝—a rise of 1. In the Suburban and Provincial group, Alliance and Dublin old marked 18, British from 42¾ special to 43½, Southampton 110½ and 111, Wandsworth "B" 140 free, and West Ham 121¼ and 122. Brentford new rose 4, and East Hull 3. In the Continental companies, Imperial was rather weaker at from 179 to 180½, ditto debenture realized 97, and Union 99½ special and 100¼ *cum div.* Among the undertakings of the remoter world, Bombay fully-paid changed hands at 5⅝ and 5¾, Buenos Ayres at 13$\frac{13}{16}$, Monte Video at from 12½ to 12¾, Primitiva at 6⅞, ditto debenture at 94¾ and 95, River Plate at from 14⅞ to 15⅛, ditto debenture at 97, and San Paulo at 13¾.

ELECTRICITY SUPPLY MEMORANDA.

Aggrieved Electricians—Public Lighting Tests—Popular Preference—Contemporary's Misstatements—Beaten at 1d. per Unit—Electrical Accidents—Losses on Metropolitan Municipal Undertakings.

THE beatings that electricity has been getting in fairly conducted competitive demonstrations of lighting by incandescent gas burners and electric lamps are causing some of our electrical contemporaries to feel rather sore and vindictive, and to show their resentment in misrepresentation. That is unworthy of the cause. An article, headed "Street Lighting," recently appeared in the "Electrician;" and there is in it so much perversion that it is difficult to disentangle it from that which might be allowed to pass as fair comment from a rival. The main part of the article deals with the recent contest at Bradford between incandescent gas lighting and electricity, from which contest the former issued with flying colours. But in the introductory paragraph of the article, in a reference to comparative tests, our contemporary does itself much credit by the display of a great depth of faith in the virtues of electricity as a street-lighting agent. Referring to the subject of comparative tests generally, it is remarked: "Where such tests are carried out on scientific lines, and due attention is paid to securing a fair and equitable basis of comparison, electrical engineers have little to fear as to the results obtained." We have been labouring under the impression that, where tests are conducted on scientific and practical lines, electrical engineers have something to fear, and that it is only when a municipal electricity department is eager for the street lighting and is unduly favoured, that electricity has any chance of success. We should like to know how it was (assuming our contemporary is correct) that after a straightforward contest—in the same road, all the surroundings being equal—between inverted gas-lamps at ordinary pressure and Osram metallic filament lamps, the South Suburban Gas Company secured the Beckenham public lighting contract for a number of years. Our contemporary presumably does not know the reason. It was because trial of the competing systems was carried out on both scientific and practical lines.

Turning, however, to Bradford, our contemporary admits that "popular feeling in Bradford is at present favourable to incandescent gas lighting;" and this after the special lighting demonstration! In this case our contemporary tries to explain away the popular favour by stating that the gas-lamps were placed at a height of only 11½ feet, while the arc lamps against which they had to compete were at a height of 25 feet; and we are to deduce from this that the gas-lamps dazzled and deluded the people of Bradford. Very well; they must have been good ones to have had this effect. The contention of our contemporary is absurd. It so happens that at Beckenham popular feeling was also favourable to incandescent gas lighting; but there the inverted gas-burners and the metallic filament lamps were placed in the ordinary street lamps all at the same height, so that one was not favoured by height to the disadvantage of the other. The fact of the matter is that the public decide their preferences in this matter in a very practical manner. They do not go crawling about the streets with illumination photometers, and make tests on the surfaces of the roadways or kerbs, or a foot or two above, and obtain curves and results that in any two sets of tests by different experimenters never by any chance agree (*vide* back issues of the "Electrician"); but they take a stretch of street, and are fully competent to judge the efficiency of the illumination. It is a far cry from Bradford to Beckenham; and, we repeat: How is it that popular feeling in both places should be favourable to incandescent gas lighting at the same time, if our electrical friends are right as to the ease with which electricity can administer a drubbing to gas?

Our electrical contemporary is not respectful to the Sub-Committee of the Bradford Corporation who had the matter of the trial in hand. The Sub-Committee, it asserts, "arrived at their decision without troubling to consider any figures as to the comparative amount of illumination provided in the two cases, apparently forming their conclusions from an inspection of the lamps, and from extraneous considerations." A little farther on in the article it is said: "Careful investigation of the details of the experimental trial appears to show that the decision arrived at in favour af gas lighting was practically a foregone conclusion, and this view may be considered as supported by the fact that the financial results of the municipal gas undertaking have recently shown unmistakable signs of the progress made by the electricity undertaking; while instructions have actually been issued that all canvassing of gas consumers by the electricity department is to cease, except in the case of an extension of mains." The writer in our contemporary has manifestly been drawing conclusions from inadequate information. That the decision could not have been a foregone conclusion is shown by the fact that the experiment was originally suggested by a member of the Council, in order to secure the lighting for electricity; and many of the members were in favour of electricity until they saw the results for themselves. Nor had the financial position of the Gas Department anything whatever to do with the decision. Again, the matter of canvassing did not enter into the discussion of the question at all; as a fact, it did not come before the Finance Committee (who had the settlement of the lighting question) until the very week that our contemporary's article appeared. The point only relates to the exceedingly unfair canvassing of the customers of the Gas Department by the Electricity Department, and the misrepresentation of which use has been freely made; and this is what is to be stopped.

Our contemporary has also something to say on the question of costs; but not all that might have been said. In what is said there is a decent bit of nonsense. It is remarked that "as soon as the electrical engineer issued his report, giving the cost of the arc lighting as 6s. 5d. per yard of street, it was followed by the report of the Gas Manager, in which the cost of incandescent gas lighting was stated as 6s. 4¾d. per yard. Further comment is unnecessary, except to point out that electricity gave more than double the amount of light at about the same cost. . . . Much has recently been heard of the wonderful results obtained with high-pressure gas lighting. After an inspection of many existing installations, the Gas Manager at Bradford had to report that such lighting would cost no less than about 18s. per yard of street, as compared with the figure of 6s. 5d. for flame arc lamps every 40 yards." These statements as to relative costs are misleading. The Gas Department were told that 6s. or 7s. per yard was the utmost expenditure the Council would sanction; and the Electricity Department in consequence brought down their price to 1d. per unit, although they are being paid over 2d. for their other street-lamps! The costs for the gas-lamps were based on actual expenses, including gas at 1s. 5d.—the price that has been paid for street lighting during the past three years. Then again we emphatically assert that the Gas Engineer of Bradford did not report any such nonsense as that high-pressure gas lighting would cost 18s. per yard. We cannot imagine who has been "enlightening" our contemporary on this subject.

Gas won in the trial in a fair and square manner. Public opinion, as our contemporary confesses, was strongly in favour of gas as being the better light; and the Sub-Committee (including the Chairman of the Electricity Committee) were so unanimous that the decision was not disputed when it came before the City Council for confirmation. It is true that not much notice was taken of illumination curves, or even of the—may we venture to say obviously faked?—photographs that were shown to bolster up the claims of arc lighting. There is one other denial to be made of our contemporary's statements. It is suggested that mantles were carefully renewed immediately before the Sub-Committee's inspections. This is an absolute fabrication. We cannot think that articles such as the one here reviewed, interlined as it is by misrepresentation and misstatement, will do much to forward the cause of electricity for public lighting.

As usual the report of Mr. G. Scott Ram, His Majesty's Electrical Inspector of Factories, is an instructive document; and it shows the thoroughness with which the work of the department is performed, and whatis more the necessity for it. There is all too much careless installation in factories, inadequate supervision, employment of incompetent men, employment of skilled men when systems are alive while the work might be done when the systems are dead, and there is still a good deal of unsafe machinery put on to the market which gets installed in factories—by incompetent judges. The impression left upon one's mind after reading the report is that there is, one way or the other, a fair amount of incompetence abroad in the electrical industry. With regard to the accidents at electrical generating stations and sub-stations during 1908, Mr. Scott Ram reports that, at company and local authority stations, there were of non-electrical accidents 311 that were non-fatal, and 3 that were fatal; and at private stations 35 that were non-fatal. Of electrical accidents, there were at company and local authority stations, 74 that were non-fatal, and 2 that were fatal; while at private stations there were 16 that were non-fatal. These accidents show a slight increase over those of the previous year; but this is partly accounted for by the inclusion of accidents occurring in generating stations and sub-stations of certain electric railways, which were not embraced in previous tables. In the non-fatal accidents, there are some that were so severe as to have probably caused permanent disablement. Regarding the reported electrical accidents in factories, engineering works, &c., there were 222 non-fatal and 12 fatal. The number of accidents in such places is somewhat less than for the preceding year; but the number of fatalities is greater. The number of accidents in the use of portable apparatus is considerable—42 of the total of non-fatal accidents. In three, the main injuries were shock due to the use of hand lamps; in the remainder, the injuries were burns due to short-circuits. The Chief Inspector makes some comment on the unsatisfactory design of plug connectors. Some remarks are made in the report upon the exhibits at the Manchester Exhibition last year. The exhibits generally indicated that much more attention is paid by manufacturers to questions of safety than was the case a few years ago; but Mr. Scott Ram points out that there were nevertheless examples showing that this point of view is still frequently overlooked by the designers of apparatus. There is ground for the Chief Inspector characterizing as the "most important work" accomplished during the year the establishment of the new Home Office regulations in respect of electrical installations in factories, generating-stations, &c. These come into force on the 1st prox.; and it is hoped they will have the effect, by improving the standard of work generally, of reducing the number of preventable accidents.

Attention has been drawn by the "Municipal Gazette" to the London County Council's summary of the returns of the metropolitan municipal electricity undertakings for the year ending March, 1908, which shows that the losses are increasing. This will be seen from the following table showing the amounts by which three of these municipal concerns were subsidized out of the rates in the years 1906-7 and 1907-8:—

	1906-7.		1907-8.
Battersea	£9380	..	£14,700
Woolwich	9794	..	29,561
Fulham	—	..	1,317

It is wondered by our contemporary how the ratepayers in these boroughs relish paying such large sums for the privilege of having a municipal electricity supply. A tilt at the Battersea Progressives follows. About four years ago they were boldly announcing that their undertaking had turned the corner, and would soon be showing large profits. As a matter of fact, the losses have been increasing year by year ever since. Municipal trading advocates, it is remarked, are welcome to any comfort they can extract out of a sum of £5130 contributed to the rates by the Hammersmith and Hampstead undertakings in 1907-8. This is a very poor set-off against the losses in other boroughs; and, what is more, the returns do not show to what extent the ratepayers all over London have been called upon to contribute indirectly through the public lighting accounts towards the upkeep of this form of municipal enterprise. Another table in the return indicates that since municipal electricity was started in London, five of the boroughs have had to bolster up their undertakings by contributions out of the rates totalling up to £121,459; while only four boroughs have been able to make any attempt to relieve the rates, and that to the extent of only £36,695. If it were possible, observes our contemporary, to estimate the indirect subsidies, it would probably be found that in no case has there been any genuine profit.

Use of Gas for Inflating Balloons.—Were it necessary to have another proof of the development of aërial navigation during late years, it could be found in the statistics in regard to the quantities of gas utilized to inflate balloons. According to "La Technique Moderne," it is estimated that in the year 1907, no less than 70½ million cubic feet of gas were employed for the purpose. In this total, Germany and France are represented by about 17¼ and 17¼ million cubic feet, England by 8¼, Belgium by 7¼, Italy by 3¾, and the United States by 2½ millions respectively. Then follow Switzerland, Austria-Hungary, and Sweden with smaller quantities making up the total.

ALKALI WORKS CHIEF INSPECTOR'S REPORT.

THE Forty-Fifth Annual Report of the Chief Inspector under the Alkali Works Regulation Act, 1906, was issued on Saturday. It embodies the results of the work of Mr. R. Forbes Carpenter and of the several District Inspectors during the past year, and, as usual, contains various matters of special interest to our readers. To-day we can do very little more than epitomize Mr. Carpenter's report, leaving for subsequent issues a fuller notice of it, as well as of the reports of his colleagues.

The number of works registered under the Act in England, Ireland, and Wales on Dec. 31 last was 1261. Of these, 72 only were works decomposing salt with evolution of muriatic acid, and so scheduled as alkali works; while the remainder (1189) carried on processes which were scheduled or were subject to registration under the Act of 1906. These numbers show an increase of 30 scheduled and registered works compared with 1907. There are also 163 works registered in Scotland, which, as usual, are dealt with in a separate report—bringing the total number of works registered in the United Kingdom to 1424. The number of separate scheduled and registered processes under inspection last year was 1839, compared with 1821 in 1907. These numbers show a slight net increase in 1908 over the corresponding figures, but not so great as the number of new works registered. There is a noticeable increase in the works manufacturing sulphate and muriate of ammonia; these, with gas liquor works, accounting for upwards of 31 per cent. of the processes under inspection. The Inspectors paid 4860 visits to works, and carried out 5170 tests, compared with 4269 visits and 5266 tests in 1907. It is gratifying to find that no proceedings were taken against the owners of registered works in 1908; but at the close of the previous year the question was under consideration in four cases. In one of these a fine of £20 was imposed for non-observance of the "best practicable means" in the manufacture of sulphate of ammonia.

SULPHATE OF AMMONIA AND GAS LIQUOR WORKS.

Mr. Carpenter reports that the number of works in this class continues to increase—having risen from 554 in 1907 to 578 last year. No notable alteration in the method of dealing with the foul gases evolved during manufacture stands to be recorded during the year. Where purification by oxide of iron is used, an increasing number of works have adopted the form of oxide heap in place of the box purifier constructed of brick and cement. In either case an impervious bottom has to be prepared; previous experiences having shown to what unexpected extent the noxious gases can make their way through ordinary made-ground to cause their effects to be felt at quite a considerable distance from the purifying apparatus. This subject was mentioned in the Chief Inspector's reports for 1905 and 1906. He says it is necessary to emphasize the points that the arrangements for the distribution of the noxious gases among the purifying heap or heaps call for the observance of the same precautions as if box purifiers were being used, and that no modification can be made in the requirements constituting observance of the "best practicable means" that were most explicitly stated in his 37th report. These remarks are followed by a further memorandum by Mr. Carpenter's Assistant (Mr. S. E. Linder, B.Sc.) on the results of his analysis of ammoniacal liquors.

RECOVERY AND PRODUCTION OF AMMONIA.

Mr. Carpenter gives his customary statistics (for which he acknowledges his indebtedness to manufacturers) in regard to the production of sulphate of ammonia in the United Kingdom. The figures—which, he remarks, again present features of interest—are as follows:

—	1908.	1907.	1906.
Gas-works	165,218	165,474	157,160
Iron-works	18,131	21,024	21,284
Shale-works	53,628	51,338	48,534
Coke-oven works	64,227	53,572	43,677
Producer gas and carbonizing works (bone and coal)	24,024	21,873	18,736
Total	325,228	313,281	289,391

For the sake of convenience, these figures are expressed in terms of sulphate of ammonia—the form in which ammonia is usually presented to the market. Mr. Carpenter points out, however, that ammonia is worked up into many other commercial products, and, in addition, a not inconsiderable amount of ammoniacal liquor is used as a reagent in the manufacture of alkali by the ammonia-soda process; and as such operations are subject to loss of the circulating reagents, a certain amount of ammonia has continually to be purchased to replace this loss. The figures, therefore, do not, he says, represent the produce of sulphate of ammonia.

As will be seen, the most important contributor still remains the gas industry, but Mr. Carpenter points out that the marked increase of produce in 1907 over 1906 was not maintained in 1908. He has reason to believe there has been, in reality, quite a substantial increase; but it has been necessary to review more closely

this year the amounts of ammoniacal liquor used in the ammonia-soda industry, as errors of method were found to exist in arriving at these figures in past years which have materially affected the total for 1908 from gas-works. Commenting upon the figures, the Chief Inspector makes the following remarks:

The decrease in ammonia recovery in iron-works is principally due to depression in the blast-furnace industry; works recovering ammonia from blast-furnace gases being almost entirely confined to Scotland. Only in special districts is coal possessed of sufficient hardness to stand in the blast-furnace without crushing. The English works are confined to Staffordshire. In 1906, the maximum figure of recovery of ammonia was attained in this industry. In the opinion of competent judges, moreover, who are acquainted with the details of coal supply in Scotland possessing the necessary physical properties, it is a figure that may not again be reached. Shale-works produce again exhibits a substantial increase; showing the great excellence in working of the modern large shale-retort, variants of which are now in operation at all the Scotch oil-works, to which industry this important contributor—nearly one-sixth of the production of the United Kingdom—owes its existence. Again, too, a very substantial increase—over 10,000 tons—is shown by the coke-oven works. To the rapid development of this industry I gave special attention in the last annual report, and am able to state that further increase may be expected for some years to come; there being several large plants now in course of construction. The increase in producer-gas plants with recovery of ammonia is also a matter for satisfaction. To the successful operation of these the increase recorded in the last sub-head of the table is entirely due, as the produce in carbonizing works (coal and bone) does not show tendency to increase, but rather to decline.

Operations on a large scale for the recovery of ammonia from peat in Ireland, to which reference was made in the last report, had not commenced at the date of the one under notice (March 18).

Further Studies in Coal Carbonization.

A further contribution to the studies in coal carbonizing, which, it may be remembered, was a specially interesting feature of Mr. Carpenter's report for 1907, and more particularly to the study of some of the reactions producing hydrocyanic acid, as one of the bodies resulting from the carbonization of coal at high temperature, is given towards the close of the present report. It is only possible now to indicate briefly the scope of these important and elaborate investigations. The influence of moisture on the decomposition of methane in presence of carbon was found to be a subject on which knowledge had to be gained; and the experiments undertaken included the comparison of dry and moist methane upon porcelain and carbon respectively. The results are tabulated, as are those of similar treatment of diluted methane saturated with aqueous vapour at different temperatures, and the behaviour of the same two contact substances. The yield of ammonia is recorded in experiments bearing upon contact with wood charcoal, the results of which are also tabulated. The variable in those at 935° C., the latest in order of time, and made with all the experience gained during the research, is "rate of flow," other conditions being kept as constant as possible. Mr. Carpenter says it is manifest, from consideration of the tabulated results, that, in applying the knowledge of the facts ascertained to large-scale operations in gas-works and coke-ovens, the consideration of what has been described as "rate of flow" has an enormous influence on the products obtained in the carbonization of coal. "Temperature," he says, "is by no means the only factor of importance." This was emphasized by Professor Bone in his lecture to the Institution of Gas Engineers last year.*

Having stated the results of the simpler problems presented for study, Mr. Carpenter proceeds to consider the more intricate and complex conditions surrounding the next portion of the subject—viz., the interaction of methane and ammonia. Here the volumes of gas dealt with were larger, not only by reason of the presence of the ammonia, but because of the necessity for employing a large volume of coal gas deprived of illuminants as protecting diluent. Moreover, a fair proportion of the latter was required for sweeping forward products of reaction when the supply of ammonia was cut off. Referring to these experiments, Mr. Carpenter says:

Again endeavouring to translate results and apply them to large-scale conditions, in the continuous vertical retort a zone of maximum and continuous heat exists perhaps at about three-fifths of the depth of the retort, measuring from the top. Here the coal has thoroughly coked; the horizontal section will, under normal condition, be well filled with incandescent solid, with absence of any central gas channel such as characterizes the horizontal section of an intermittent vertical retort. Here also the gas pressure, small as this is on the continuous vertical retort, will be at a maximum, while the rate of flow of gas from its diminishing evolution will be much lessened as compared with higher zones in the retort—conditions all favouring decomposition of methane and any accompanying ammonia, and formation of hydrocyanic acid from its elements. It is in this zone, also, and somewhat lower, that it seems reasonable to look for formation of ammonia, if the reactions of hydrogen on the nitrogen existing on the still not completely carbonized coal have any actual existence, since the ammonia, if formed, has better chance of survival in the higher zones of the retort.

Mr. Carpenter requested Mr. Linder to prepare a short account of the apparatus used, the procedure, the methods observed in making the calculations for presenting the results of the experiments, and analytical notes on the tables; and this is given in the report. Following it and the tables are the conclusions arrived at, which may be very briefly summarized as follows: Wood charcoal has a marked thermal effect on dry coal gas below 750° C.; but it rapidly increases with rise of temperature. Traces of ammonia are produced, but no hydrocyanic acid below 835° C. Porcelain at 770° C. has no effect, either oxidizing or thermal, on dry coal gas. Above 850° C., both effects were strongly marked. Methane suffers thermal decomposition at temperatures below that at which carbon is capable of reacting with nitrogen to form hydrocyanic acid. Porcelain below 765° C. has no appreciable effect on moist coal gas. In addition to the marked thermal effect which characterizes the action of wood charcoal on dry coal gas, an oxidizing effect is noticeable with the moist gas; the product of such action being mainly carbonic oxide. Hydrocyanic acid is stable at 935° C. in presence of wood charcoal and with moist gas as diluent. Ammonia is produced at all temperatures between 720° C. and 935° C.; its formation being favoured by high temperature and reduced rate of flow. Hydrocyanic acid, on the other hand, is not produced in appreciable amount, under the conditions of the experiment, by direct interaction of nitrogen and carbon below 835° C. Its formation is favoured by high temperature and reduced rate of flow. Below 800° C., the oxidation and thermal effects of porcelain on methane are insignificant. Hydrocyanic acid is produced, but in small amount; but ammonia survives in large proportion. Above 900° C., the effects are more marked. Hydrocyanic acid, if produced at a slow rate of flow, is entirely destroyed; and ammonia is practically completely dissociated into its elements. With wood charcoal, the critical temperature for the formation of hydrocyanic acid is considered to lie between 755° C. and 805° C. So far as the interests of the Chief Inspector's department are affected, he says the chief difference that appeared in the gas liquor analyses of 1907-8 lay in the increased ratio of hydrocyanic acid to ammonia in the liquors from the continuous vertical retort.

Mr. Carpenter says it became increasingly evident, during the progress of the work he has been describing, that, in order to arrive at satisfactory and adequate conclusions, its scope needs extending. To continue it, therefore, in his laboratory is felt to be impossible, since to carry out such experimental work satisfactorily great and continuous devotion of thought and energy is required. The conditions imposed by the claims of administrative official duties prevent this. He believes the results he has presented are as accurate as were possible of attainment under the disadvantages existing. He considers that only in a technological institution like that at Carlsruhe, for so long under Dr. Bunte's able direction, or in the more recently established technical laboratory at the University of Leeds, under the guidance of Professor Bone, F.R.S., "whose researches into the decomposition of gaseous hydrocarbons at high temperatures have placed him in such an exceptionally advantageous position for contributing data of value towards the scientific advancement of the gas industry," can such experimental work as this be properly undertaken. In conclusion, Mr. Carpenter recognizes most warmly the zealous devotion of Mr. Linder throughout the research, for without his most able collaboration nothing would have been accomplished. He says that "if the work possesses value, the credit is really due to him."

Ammoniacal Liquors from Low-Temperature Carbonization.

In a postscript written last month, Mr. Carpenter states that, during the passing of his report through the press, opportunity occurred of examining ammoniacal liquors from coal partially carbonized at exceptionally low temperatures (800° to 850° Fahr.) in the preparation of coalite at three new works which have very recently commenced operations. The samples were derived from coals from very varied localities. Analysis of the liquors was rendered extremely difficult on account of the nature of the organic bodies present, and the standard method for estimating thiocyanate (described in a previous report) had to be substantially modified to enable this constituent to be determined with accuracy. Mr. Carpenter says that in samples from all three works undoubted evidence of the presence of cyanogen compounds was obtained; and he presents the following figures with confidence as being substantially accurate:—

Liquor.	Total Ammonia.	Cyanogen in Terms of HCy.				Per Cent. Total Cyanogen to Ammonia.
		Cyanide.	Thiocyanate.	Ferrocyanide.	Total.	
Works A—						
Virgin liquor from main . . .	0·459	0·002	Nil	Nil	0·002	0·4
Do. from condensers	5·602	Nil	0·007	0·023	0·030	0·6
Average sample from well . .	1·011	Trace	0·033	Nil	0·033	3·2
Works B—						
Virgin liquor from main and condenser . . .	0·582	Nil	0·018	,,	0·018	3·1
Works C—						
Average sample from well . .	1·717	,,	0·119	,,	0·119	6·9
Do.	3·280	,,	0·384	,,	0·384	11·7

Notes.—Liquor from Works B circulated by pump. Both liquors from Works C circulated to get up the strength.

Mr. Carpenter remarks that it is notable that, at the temperature of carbonization observed in the process, any cyanogen

* See "Journal," Vol. CIII., p. 319.

compounds at all should be formed, even when making allowance for some access of air to the retort, since flue temperatures are kept at only 100° Fahr. above the temperatures ruling in the interior of the retort—viz., 800° to 850° Fahr. (427° to 454° C.); while the research detailed in the previous portion of his report indicates that the critical temperature for the formation of cyanogen from carbon in the form of wood charcoal and ammonia lies above 1380° Fahr. (750° C.).

THE LIVESEY MEMORIAL FUND.

We have received from Mr. Walter T. Dunn the following list of further contributions to the fund:—

1909.		£	s.	d.
June 7	Previously acknowledged	9874	16	1
„ 8	D. T. Livesey, East Grinstead . . .	0	10	0
	Wales and Monmouthshire District Institution of Gas Engineers and Managers	5	5	0
„ 10	Thomas Hack, Swan Village, West Bromwich	1	1	0
	Vincent Hughes, Smethwick . . .	1	1	0
	John Miles, Bolton	2	2	0
	Sunderland Gas Company	52	10	0
„ 14	George Keyte, Workington	0	10	6
	Ossett Corporation Gas Committee .	5	5	0
	T. J. Reid, Ballina, Ireland	1	1	0
	R. J. Skinner, Londonderry	0	10	0
	W. E. Walton, Bishop Auckland . .	0	10	6
	Total	£9945	2	1

PERSONAL.

Mr. T. J. Bush, the Engineer of the Australian Gaslight Company, of Sydney, left Australia on the 30th of April last in the s.s. *Geelong*, *viâ* the Cape, on a visit to London. Mr. Bush has not been enjoying good health of late, and it is hoped that the rest and change will prove very beneficial to him. If health permits, Mr. Bush will avail himself of the opportunity of seeing the many improvements in the gas industry that have taken place in England and on the Continent since his last visit in 1899.

At the English Consulate and All Saints' Church, Milan, on the 9th inst., the marriage was solemnized of Mr. Henry Maurice Frost, Engineer at the Bovisa Gas-Works of the Continental Union Gas Company, son of Lieut.-Gen. Frost, of the Ottoman Service, Constantinople, to Miss Marion Ethel Hadden, of Milan. There was a numerous congregation of the members of the English colony and Italian friends at the ceremony; among those present being Mr. A. Clement Hovey, Chief Engineer in Milan (who was best man), the British Consul, and Mr. E. J. Luff, the Assistant-Engineer at the Bovisa works. Mr. and Mrs. Frost are spending their holiday in Venice, and they have the best wishes of their friends in Italy and England, and especially of the residents in Milan, where both are well known and highly esteemed.

OBITUARY.

We regret to announce the death, on the 8th inst., in his 57th year, of Mr. John Hutchinson, late Works Manager and Director of Messrs. Hutchinson Bros., Limited, Gas Engineers and Meter Makers, &c., of Barnsley. Deceased was the founder of the firm, in 1872. He was the third son of the late Mr. John Hutchinson, Secretary and Manager to the Barnsley Gas Company, and brother of Mr. Walter W. Hutchinson, the present Engineer and Manager.

The death occurred on the 1st inst., at his residence at Hampton, of Mr. William Goldsworthy, who, until about five years ago, was Superintendent of the Hampton station of the Metropolitan Water Board. In early life, he was employed in the large engineering works of Messrs. Harvey and Co., at Hayle, in Cornwall (his native town), who supplied to the Southwark and Vauxhall Water Company the beam-engines which are still in use at Hampton. He came to London in connection with the erection of the engines nearly forty years ago, and entered the Company's service.

We regret to learn, through the "Journal für Gasbeleuchtung," of the death on the 28th ult., at Wiesbaden, after much suffering, of Herr Robert Salm, the Manager of the gas and water works at Riga. Deceased had been for many years past a member of the German Association of Gas and Water Engineers, and a regular and much-valued attendant at its annual meetings. The same journal also reports the death, on May 22, of Herr F. Habenstein, the Manager and Chief Engineer of the Thuringian Gas Company, which has its headquarters at Leipzig. Deceased was in his 62nd year, and had recently completed 25 years' service with the Company. The death also is announced, as having taken place on May 14, of Herr C. Lamb, who from 1885 to 1895 acted as assistant, and from the latter year as Manager, of the gas and water works at Würzburg. He retired from the Managership in 1906.

As the result of a trap accident which occurred last Friday week, Mr. Andrew G. Sutherland, Director of the Sutherland Meter Company (whose new works at Wilton were noticed in the "Journal" about three months ago), and patentee of the Sutherland gas-meter, unhappily lost his life. The fatality took place at Erdington, very near Mr. Sutherland's home. Deceased was driving a young mare which had not been in harness for some time; while his son, Mr. W. C. Sutherland, and a groom led the animal by a rein on either side. After a short time, the mare became troublesome, with the result that the bridle broke, and the bit came out of her mouth. Being thus completely out of control she dashed away with Mr. Sutherland senior, and in negotiating a corner overturned the trap and threw her driver over a hedge into a field. When removed to his house close by, it was found that Mr. Sutherland was dead; his neck having been broken. Deceased, who was 64 years of age, had but lately recovered from a severe illness. He was a native of Orkney, and was well known and much respected in Erdington, where he had resided for some years past. At the inquest a verdict of "Accidental death" was returned; the Coroner and the Jury expressing sympathy with Mrs. Sutherland and the family in the bereavement they had sustained.

SOCIÉTÉ TECHNIQUE DU GAZ EN FRANCE.

Programme of the Annual Meeting.

We have received the programme of the annual congress of the Société Technique du Gaz en France, which will open next Tuesday in the large hall of the Hôtel de la Chanson, Lyons, under the presidency of M. Godinet, gas engineer associated with the firm of MM. de Lachomette et Villiers, of Lyons, who have in their hands a number of gas-works.

The morning of the first day will be devoted, as usual, to the routine business; and the afternoon and parts of the three following days to the delivery of the President's Address and the discussion of the 21 papers. M. Parsy will present a note on the net price of gas in the retort-house; M. Grebel will bring under notice the Parsy retort; M. Hovine will describe a regenerative furnace with an arrangement for heating by tar, the latter subject being also dealt with by MM. Echinard and Ménard; M. Bitard will describe M. Villain's retort-stoking system, and M. Teulon the method of quenching coke in use at the Marseilles Gas-Works; MM. Badon-Pascal, Aubert, Aublant, and Gaulis will furnish information in regard to the Rostin, "Alex," and other distance lighters; MM. Schrimpf and Allirol will deal with the fixing of meters; and MM. Richarme and Laforgue will introduce the "Rolin" high-power burner and new incandescent burners on the Rabeux system. The remaining papers will describe water-heaters and other appliances. In addition to the papers, there will be discussions on the subjects of machinery for charging retorts in small gas-works, lighting and extinguishing burners at a distance, the utilization of tar, the treatment of ammoniacal products in small works, and the use of india-rubber joints for mains.

On Tuesday evening the members will be the guests of the Lyons Gas Company at a banquet at the Restaurant Berrier et Millet; the next afternoon will be devoted to visits to the gas and electricity works, and in the evening the Gas Company's showrooms, which will be open all through the congress, will be visited. On Thursday afternoon, the members will be able to inspect the generating station of the Lyons Omnibus and Tramways Company and other works; and in the evening the subscription banquet of the Society will take place in the Salle Rameau. On Friday afternoon there will be an excursion, to which ladies are invited, to Mont Verdun and Poleymieux; and *en route* there will be a reception by the Lyons Gas Company. During the congress, a free visit to the remarkable Museum of Fabrics will be organized for the ladies.

Anti-Socialist Literature.—We have received from the Literary Secretary of the Anti-Socialist Union of Great Britain (Mr. P. S. Bridgeford) three of the useful pamphlets the Society are issuing with the view of directing attention to the dangers of Socialism, and checking its growth. In one pamphlet, Mr. J. B. Wilson deals with "The Fraud of Socialism," and exposes the Socialists' plot to capture the Trade Unions, secure control of their funds, and use them solely for the furtherance of their revolutionary political aims. In another pamphlet, the failures of Socialism in Great Britain, France, America, and other countries are concisely presented, with an introduction by Mr. Thomas Macay. The third pamphlet is by Mr. Willie Dyson, whose contributions to "The People," under the *nom de plume* of "Will Workman," may have come under the notice of some of our readers. Mr. Dyson deals with mining royalties, the appropriation of which is being constantly advocated by agitators for the confiscation of other people's property; and he shows that, on the authority of the present Prime Minister, it would have required some £150,000,000 fifteen years ago to compensate the owners of all the mines and minerals in the United Kingdom for their nationalization, and that no case whatever had been made out for such a change. The three pamphlets may be had for a few pence from the Society, whose offices are at 58 & 60, Victoria Street, S.W.

THE ASSOCIATION OF WATER ENGINEERS.

ANNUAL GENERAL MEETING IN DURHAM.

The Fourteenth Annual General Meeting of the Association was held in Durham last week. Assembling in the Town Hall at 10 a.m. on Thursday—Mr. H. E. STILGOE, M.Inst.C.E., the City Engineer and Surveyor of Birmingham, in the chair—the Association were welcomed by his Worship the Mayor (Mr. John F. Boyd, J.P.), along with whom on the platform were several Aldermen and Councillors.

The Mayor's Welcome.

The MAYOR said he had great pleasure in being present to offer the Association, on behalf of the Aldermen, Councillors, and citizens of Durham, a cordial welcome to the city. It gave him additional pleasure to find that Mr. Askwith, an old and valued friend of his late father, and one who worked with him for many years in the interests of water supply, was President for the year; and he wished him every success during his term of office. He was pleased the Association were holding their annual meeting in Durham; as it gave those of them who had not been there before an opportunity of visiting some of the places of interest in the ancient city. The supply of good, pure water for domestic purposes, especially in large towns, was a very important matter; and this had been dealt with most satisfactorily by their Water Engineers. In Durham they had, from the Weardale and Consett Water Company's reservoirs, a plentiful supply of excellent water, not only for domestic purposes, but sufficiently plentiful and at a pressure strong enough to cope with any fire that might occur in the city. Many of the old citizens would remember, not so many years ago, that their only supply was from what was known as the Pant and a few wells in different parts of the town; and the water had to be carried from these springs to the place where it was required. In his own time, it was a regular thing, if they walked through the Banks, to see a large number of people carrying water from the Banks Well for their domestic needs. This was one of the popular wells in the city, and was thought to be very pure; but, if he remembered correctly, upon analysis it turned out to be the reverse. Now all was changed, very much for the better; and, thanks to the work done by their water engineers, they had a plentiful supply of pure water brought to their doors. He would not trespass further upon their time, but would again offer them a hearty welcome to the city.

The PRESIDENT (Mr. Stilgoe) said that once more the Association were accorded a hearty welcome to the town in which their meeting was being held; and he was sure the members would agree with him that that morning they were much indebted to the Mayor of Durham for his kindness in welcoming them. It was a great matter for the Association that they should be received, as they always were, with such kindness and courtesy by the Chief Magistrates of the towns in which they assembled. It evidenced keen interest in their doings, and showed that the towns appreciated the work in which the Association of Water Engineers were engaged. He had the pleasure of proposing a hearty vote of thanks to the Mayor for his address of welcome; and he was sure the members would be gratified to know that three of the Aldermen and two or three Councillors of the city were also present to welcome them. He then formally proposed the vote of thanks, and asked the meeting to carry it by acclamation.

This having been done,

The MAYOR briefly expressed his acknowledgments, and the municipal party retired.

Minutes of the Last Meeting.

The SECRETARY (Mr. Percy Griffith, M.Inst.C.E.) then read the minutes of the winter meeting, held in London on the 11th and 12th of December last; and they were adopted.

The New and the Retiring Presidents.

The PRESIDENT said that it was now his pleasing duty to introduce to the members formally—because there was no need for an introduction otherwise—Mr. Robert Askwith, Member of the Institution of Civil Engineers, and Engineer to the Weardale and Consett Water Company, as their President for the coming year. Mr. Askwith was the Engineer to a Company having control of an area of water supply as large as about one-third of the county of Durham. He was well known to them all; and they had chosen him as their President because of his recognized ability, and for the services which he had already rendered to the Association. He (Mr. Stilgoe) would not take up time then, as the members would have an opportunity afterwards of referring to Mr. Askwith; and he therefore vacated the chair in his favour. Addressing Mr. Askwith, the retiring President said: I present to you, on behalf of the Association, your certificate as President; and I wish you a very happy year of office.

Mr. ASKWITH took the chair amid loud expressions of appreciation, and said he accepted the certificate with some trepidation, for he already knew the amount of work entailed upon the President; and it was always a difficult thing to follow a good man. If one's predecessor had done his work badly, the members would be relieved to get rid of him, and would be glad to take almost anybody else in his place. But following a gentleman like Mr. Stilgoe was a very hard matter indeed. It fell to his lot now to propose a vote of thanks to Mr. Stilgoe for his work during his year of office as President; and he did it with a certain amount of pleasure as well as with a certain amount of sorrow. He did it with pleasure, on looking back to Mr. Stilgoe's work, all of which had been carried on so admirably. By his courtesy and by his firmness, he had always ruled the meetings of the Council fairly and well; and they were very sorry indeed to lose him as their President. He begged to propose to the members formally that they give Mr. Stilgoe their best thanks for his services during the past year—a proposal which he was sure they would carry by acclamation.

The vote was cordially agreed to.

Mr. STILGOE thanked the meeting most sincerely for the kind vote of thanks they had passed to him for his services in the chair. He assured them that his year of office had been one of great pleasure as well as one of very great instruction to him; and he took the opportunity of thanking the members of the Council and of the Association generally for their kindness and support on all occasions. Had he not felt that he had the sympathy and support of the entire Association, he would have been unable, at any rate with satisfaction, to carry out his duties. He had tried, during the year, to keep foremost the honourable and proud position to which the Association had attained. It was an Association of Water Engineers, representing the interests of the health of the community, so far as the provision of a pure water supply was concerned; and therefore it must be understood that the work of the Association was one which he might say had great responsibilities attached to it. He thanked the members very much for their kindness to him at all times, and particularly for the vote which they had accorded him.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

The Association is yet in its youth; being now only in its fourteenth year. It has survived the period of infancy; has passed the time of childhood; and is now in a fair way to attain the age of manhood in a condition of robust health combined with increasing powers of development and extending usefulness to the community.

Even in these few years, two Past-Presidents, to whom the Association owes much of its present position, have been called away by death; and we deeply deplore the absence of their ripe judgment in conducting the affairs of the Association. I allude to Mr. William Augustus Richardson, President for the year 1901-2, and Mr. Robert Henry Swindlehurst, President for the year 1903-4—the latter of whom passed away, after a very short illness, in March last.

In membership, steady progress is being made, as is shown by the following figures, which give the numbers on Jan. 1 of each of the last three years:—

	1907.	1908.	1909.
Honorary members	2	2	3
Members	208	206	207
Associate members	90	108	116
Associates	32	36	39
Totals	332	352	365

It will be noticed that, as on former occasions, the increase is chiefly under the heading of associate members;

and I agree with my immediate predecessor that this may be looked upon as a very satisfactory feature of our progress. At the same time growth in numbers is only one sign of healthy development; and it is our duty to see that the Association increases in usefulness, not only to members, but to the community at large. Let every member ask himself what can be done in future to extend the usefulness of the Association, and send any suggestions that may occur to him to the Secretary for consideration by the Council. Many such suggestions have been received, and the Council have always given them careful consideration. The offer made by our retiring President of a £10 premium for a paper entailing research work, and the decision lately come to by the Council to award two premiums of £5 each for papers selected by them, will, it is believed, produce valuable contributions to our "Transactions." I cordially invite those younger members whose time is not yet fully occupied to enter into healthy competition for these premiums. This step alone will mark the year of Mr. Stilgoe's presidency as one in which true progress was made.

It has been suggested to me that a standard form of general conditions to be attached to specifications of work for which tenders are being invited, would be of great use to our members. This, I am informed, has already been done by the Institution of Gas Engineers; and the advisability of our Association taking a similar step will be duly brought before your Council for consideration.

It would also prove useful to members if a table were prepared showing what figure should be generally accepted as a reasonable maximum consumption of water per head per day for domestic purposes by communities which are supplied under different circumstances and where constant supply is given. It is difficult to understand why the rate of domestic consumption should vary from 10 to 40 gallons or more per head per day in different districts. There are, of course, reasons for some differences. For example, where the public supply of water is hard it is often supplemented by the use of soft rain water for washing purposes; and the consumption of the public supply is in such cases lower than when this is soft and suitable for all purposes. The number of baths and water-closets relative to the population supplied must also have a great effect on the consumption. But these and other such local differences do not fully account for the great variations that exist. If, however, in the cases where the consumption is relatively high, the difference is caused by waste, the matter is worthy of our most careful consideration. If we assume that 30 million people in these isles take their water supply from public undertakings, and the waste is only a gallon per head per day, the value of the water wasted, when worked out at the very low price of 6d. per 1000 gallons, amounts to more than a quarter-of-a-million pounds sterling each year. The question of prevention of waste is thus seen to be one of great importance from a monetary point of view; but when we remember that the supply of pure water in this country is limited, and that the various sources are being rapidly appropriated, it at once becomes a question of vital national importance.

The two most important considerations to be borne in mind in endeavouring to minimize the waste of water are, firstly, to see that only the best quality of water-fittings and the highest class of plumbing are employed in connection with water undertakings, and, secondly, the adoption of an efficient system by which repairs (which in time become necessary, however good the fittings may originally have been) are carried out without loss of time. I would remind you that the first of these matters has now for some years been under the consideration of the Joint Committee on Water Regulations which has lately been incorporated, and on which this Association is largely represented. The Committee have now issued a Model Code of Regulations, which, although not perfect, is an honest attempt to improve the standard of fittings and plumbing work; and they have also appointed a Standardization Committee (with the Secretary of our Association, Mr. Percy Griffith, as Secretary) for the purpose of extending the standard specifications of water-fittings as occasion may require. This Sub-Committee will receive with pleasure any information on this subject which members may be good enough to submit.

The Incorporated Joint Committee have recently registered a standardization mark, which manufacturers of fittings will be allowed to stamp on fittings made in accordance with the standard specifications of the Committee as regards shape, dimensions, weight, material, and workmanship. The privilege of using this mark will be withdrawn from any manufacturer proved to have applied it to fittings that do not comply with the Committee's requirements; and by this means the purchaser and user of water-fittings will be protected from the trouble and expense involved by the supply of inferior fittings, and the water authority from much needless waste of water. The Committee have also made arrangements by which stamped fittings can be examined and tested at various centres distributed throughout the country, at moderate fees.

I cannot better conclude my remarks on the work of the Incorporated Joint Committee than by quoting the following comment that has been made upon it: "The establishment of the Incorporated Joint Committee on Water Regulations with a legal status and a constitution representing the statutory authorities supplying the majority of consumers in the United Kingdom, marks a new era in the history of water administration and conservation. The objects of the Committee in no way conflict or interfere with the operations of any water undertakings or professional bodies, but are purely complementary and supplementary to these functions. Thus the establishment of the Committee, while it can hamper none, offers to all concerned a convenient medium for obtaining specially collected information, while it also affords them the advantages of meeting in conference and uniting in action in matters affecting their common interests, when they desire to do so." I therefore strongly recommend members to take full advantage of the work of the Incorporated Committee, and to submit all new fittings to a careful examination in regard to the nature of the metal used, the design, and the workmanship of the various parts. The testing of a water-fitting for pressure alone is no proof of its ability to stand wear and tear, as if the alloy is unsuitable (the metal being too brittle or too soft), or the threads are badly cut, the effects will be evident after a short period of regular use.

The General Council for the National Registration of Plumbers have acknowledged the influence of the water engineer and of our Association on the question they have been formed to administer, by electing Mr. Easton Devonshire (a member of our own Council) as Chairman of the Managing Committee; so that this vexed question will now be considered and dealt with on broader lines than heretofore. It is hoped that the time is not far distant when incompetent plumbers will not be allowed to carry out any work in connection with water distribution, and that by the elimination of incompetency in the plumbing trade much preventable waste of water may be checked.

As regards my second point—namely, the prompt repair of fittings found to be defective, much remains to be done. Under the usual system of water-works management, delay in carrying out repairs is only too common. A leakage is reported by an inspector, and a notice to repair is sent by post to the consumer, who sends it to his plumber, who, in his turn, may be engaged on some work which appears to him of greater importance; and thus the delay may involve enormous loss of water. In the event of the leakage being underground or in some invisible or inaccessible position, the delay will probably be more serious still.

The system adopted by the Weardale and Consett Water Company, of insurance of fittings, has been very effective in securing the prompt repair of defects. The Company contract to repair and renew, as necessity arises, all pipes and taps for a payment of 1s. per year for each draw-off tap. This system was established more than 30 years ago, and has steadily grown in favour until the Company have now over 44,000 taps under their care. A staff of plumbers, stationed at different centres in the district of supply, is engaged in visiting the houses from time to time and in carrying out repairs. Any reports of waste received either direct from consumers or through the Company's inspectors are promptly attended to. Under this system, the consumer, knowing that the cost of the repairs is covered by the insurance premium, has no inclination to delay the repairs, but rather takes a delight in pressing for immediate attention to his complaint. By this system the waste of water has been reduced to a minimum; and the consumption last year averaged only 9½ gallons per head per day for the domestic supply of a population of 360,000. This includes all water consumed by builders and for gardens, cattle, small trades, and washing out service tanks and flushing pipes—meter supplies alone being excluded from the figure quoted.

Before leaving this subject, it may be interesting to show the monetary importance of preventing waste, by quoting

some figures in connection with the Newcastle and Gateshead Water Company. Owing to the increase of population in the Company's district during the nine years from 1900 to 1908 inclusive, more than 22,000 extra houses, containing a population of about 110,000 people and having nearly 17,000 water-closets and 9000 baths, were connected to the Company's mains; the additional income from this source amounting to upwards of £20,000 per annum. In spite of this extension of the supply, the total consumption of water for domestic purposes was less in 1908 than in 1900.

It is unfortunately too often the practice to conclude that when new works are brought into use and the supply of water is abundant, it is not necessary to incur expense in preventing waste; and with a view to economy the number of inspectors is reduced, or not increased in proportion to the growth of the population supplied. The result is that during the period when efficient control is lacking, inferior fittings come into use which it may take 25 to 30 years to weed out; and until they are replaced, considerable waste occurs.

"Venturi" meters can now be obtained which do not retard the flow of water except to an inappreciable extent; and as the value of water is so great, it is advisable to go to the expense of having one of these meters fixed on each main pipe at a point where the water leaves the source of supply. If this is done, the diagram on the meter will record the maximum and minimum flows; and the quantity of water consumed each day will also be indicated. At stated times (say monthly) the manufacturing consumption can be deducted from the total consumption, and figures giving the domestic consumption obtained, which can be reduced to a quantity per head per day.

The table I have suggested—showing what figure should be generally accepted as a reasonable maximum consumption of water for domestic purposes in various districts—would be then useful in indicating what the consumption per head per day should be under the special circumstances prevailing in any district; and by this means, if the figures giving the actual consumption have been obtained, it would be at once seen whether the prevention of waste was properly carried out or not.

I do not propose to deal here with any questions relating to water engineering, as, by custom, discussion is not allowed upon a presidential address, and such matters are more usually presented by means of papers open to free discussion. I may, however, be allowed in general terms to refer to two matters which have previously been mentioned in presidential addresses, and which appear to be worthy of our careful consideration—viz., the use of reinforced concrete in the construction of reservoirs and tanks and the use of suction-gas plants for pumping water.

Reinforced concrete construction may prove satisfactory on sites where the foundation is liable to be disturbed by underground works, brine pumping, or earthquakes; also, in forming large conduits for the conveyance of water, this material certainly has advantages over iron for very soft water, which is injurious to the inside of cast-iron pipes, and in cases where acids in the subsoil cause injury to the outside. The main question, to which lapse of time alone can give an answer, is whether in some cases the deterioration, and consequent weakening, of the reinforcement may not ultimately prove a source of serious danger.

The use of suction-gas plant for pumping purposes is being dealt with by Mr. Irwin in his paper to be presented to this meeting, and will, I hope, be fully discussed. A plant of this description has been installed at the Waskerley Reservoir, which is to be visited by the members to-morrow; but time alone can prove whether the economy of working, undoubtedly secured in the first instance by these plants, will be maintained for any considerable period when the question of wear and tear is duly faced.

On these and other kindred subjects it is to be hoped that water engineers, whether members or not, will readily supply the Association with the results of their experience from time to time. The publication of such information by a representative body such as ours cannot fail to be of service to all who are interested or concerned in the work of the water engineer.

At the close of the address,

Mr. F. GRIFFITH (Leicester) proposed a hearty vote of thanks to the President for his excellent address, coupled with the request that it might be added to the "Transactions" of the Association.

Mr. WILLIAM MATTHEWS (London) seconded the vote of thanks to the President for giving the members, in so concentrated a form, the benefit of his large and long experience on the subjects with which he had dealt.

Mr. STILGOE put the proposition to the meeting, and it was agreed to.

The PRESIDENT briefly thanked the members.

New Members and Associates.

Mr. R. B. Rigby (Bury) and Professor Henry Robinson (Westminster) were nominated by the President as Scrutineers of the ballot-papers for the admission of members and associate members; and at a later stage of the proceedings they reported that all the following candidates had been admitted:—

Members.—**Mr. A. C. V. Baines, of Somerset East (S.A.); Mr. A. Cox, of Falmouth; Mr. C. F. Farrington, of Colwyn Bay; Mr. A. Ll. Forster, of Newcastle-on-Tyne; Mr. E. B. Martin, of Rotherham; Mr. J. H. Smethurst, of Longridge; Mr. G. Smith, of Newcastle-on-Tyne; Mr. J. R. Sutherland, of Glasgow; and Mr. G. Winter, of Darlington.**

Associate Members.—**Mr. U. Alexander, of Newcastle-on-Tyne; Mr. W. M. I'Anson, of Saltburn; Mr. A. J. Price, of Chesham; and Mr. F. G. Stevens, of Wakefield.**

Election of Honorary Auditors.

The PRESIDENT nominated as Honorary Auditors for the current year Mr. W. Vaux Graham (Westminster), and Mr. J. C. Melliss (London); and the nominations were approved.

Papers and Discussions.

The papers prepared for the meeting were:

"Steam-Driven Pumping Plant for Deep Wells and Boreholes," by ALFRED TOWLER, M.I.Mech.E.

"Working Results of Pumping-Engines Operated by Producer Gas," by D. HASTINGS IRWIN, M.I.Mech.E.

"The Selby New Water-Works," by PERCY GRIFFITH, M.Inst.C.E., and BRUCE M'GREGOR GRAY, Assoc.M.Inst.C.E.

"Public Water Supply for Fire Extinguishing," by C. W. S. OLDHAM, Borough Water Engineer, Ipswich.

The PRESIDENT intimated that he had intended to call upon Mr. Gray to read the paper on "The Selby New Water-Works;" but, unfortunately, a telegram had been received from him, stating that he had been delayed at York, and might be late for the meeting. He proposed that the paper should be read; and he called upon Mr. Percy Griffith, the joint author, to read it.

The paper was accordingly read by Mr. Griffith and discussed. It will appear, with the papers by Mr. Towler and Mr. Oldham, and the report of all the discussions, in subsequent issues of the "JOURNAL." The paper by Mr. Irwin is given on p. 727, and is dealt with in our editorial columns.

Saturday, June 12.

On resuming on Saturday morning, the PRESIDENT, referring to the small attendance, remarked that the hall seemed to have grown larger since they met there on Thursday. He proposed that two of the papers should be taken together, so that they might have a general discussion upon the question of Steam *v.* Suction Gas. They would have the paper by Mr. Towler first, and afterwards that by Mr. Irwin.

At the close of Mr. Towler's paper, however, the PRESIDENT rose and said he was afraid they might think him a somewhat vacillating President; but he thought it would be perhaps better, after all, to have a discussion upon Mr. Towler's paper by itself. The question raised in it was more on the pumps than anything else, and in Mr. Irwin's paper it was a question of gas *v.* steam.

Mr. Towler's paper was accordingly discussed, and Mr. Irwin afterwards read his paper.

In closing the discussion upon it, the PRESIDENT said the Secretary suggested to him that he should perhaps take their opinion as to the course to be adopted by the meeting. If members were not able to come back in the afternoon, it would be a mistake to hold an afternoon meeting. They had still another paper to be read; and if members could not come back, they might take Mr. Oldham's paper as read, and have it discussed—perhaps re-read—at their winter meeting.

Mr. OLDHAM having agreed to this course, it was adopted.

Votes of Thanks.

Mr. ASHTON HILL moved that the Association pass a vote of thanks to the Chairman and Directors of the Weardale and Consett Water Company for the opportunity they gave the Association of visiting their works the previous day, and for their hospitality. In another place he had the honour of

proposing this resolution in the form of a toast; but, of course, now the proposal must be of a business character. He was sure they were all greatly indebted to the Directors of the Company for showing them over their works. At the works they observed the amicable relations which existed between the Company and their worthy President; and they could not wonder that the Company should be in a prosperous condition.

The motion was agreed to.

Mr. C. SAINTY proposed a hearty vote of thanks to the Chairman and Directors of the Newcastle and Gateshead Water Company, for their kindness in receiving the members, and also for their hospitality, which was, he was sure, most acceptable to all of them.

This was also agreed to.

Mr. EASTON DEVONSHIRE proposed a vote of thanks to the officials, including the Secretary and Treasurer, for the arduous work done by them for the Association during the past year. He knew, from experience, that they had sat a good many hours on two or three occasions in the work of the Association; and their thanks were due to them.

The motion was adopted.

The PRESIDENT proposed a vote of thanks to the authors of the papers which had been presented at the meeting. He thought they would agree with him that they had had a set of papers which were more than the average in interest of the papers which had been before the Association. The only regret they had was that Mr. Oldham's paper had not been read and discussed. When Mr. Oldham submitted the paper to them, they thought it would be a great help to them if some information were obtained as to the way in which fire-plugs were dealt with in other towns. Mr. Oldham set about and produced the sheet given in his paper. This must have taken a great deal of time and trouble; and it was because of this that he (the President) regretted so much that Mr. Oldham had not had the opportunity of reading his paper. It had occurred to him that perhaps Mr. Oldham might wish to say a word or two; and if so, they would be very glad to hear him.

Mr. OLDHAM said that his object in preparing the paper was to bring the tabulated statement forward. It was a collection of facts regarding the charges which were made in different towns. There was one suggestion at the end of the paper which might be emphasized. In some of the towns named there was rather a heavy charge made. Two guineas for one hydrant was too much. The charges for sprinklers and drenchers were in some cases too high. The object of his paper was that he suggested that exorbitant charges should not be placed on private owners for the privilege of having their fire-mains coupled on to the public water supply. There was no doubt that sprinklers and drenchers were to be much more employed than hitherto. On the Continent, and in the Colonies and in America, a very large number of sprinklers had been put in. He knew of firms who had been charged as much as £10 for the privilege of having them fitted up. He thought the charge ought to be more nominal. It should, at least, be fair both to the consumer and the water company.

The PRESIDENT then put the motion; and it was cordially agreed to.

Mr. EASTON DEVONSHIRE said that before they parted there was one more resolution to be moved, so that it might be formally entered in their minutes. It was a repetition of what they had already expressed during the past few days—their gratitude to the President for the conduct of the business of the meeting, and for his kindness, and also that of Mrs. Askwith, in the entertainment they had the previous day. There was not very much to be said, beyond the formality of asking them to approve of the resolution.

The motion having been formally adopted,

The PRESIDENT expressed his obligation to the members for the kind way in which the vote of thanks had been put; and he accepted it. He looked upon it as a very great honour, as it was a very great pleasure to him, to be acting as President; but he did not wish to hide from them that he felt the great responsibility of the office, and he hoped the members would help him to do everything he could to make the Association more powerful and more useful. As he said at the dinner on Thursday evening, he believed that the Association had a great future before it, if only they all kept before them that they must keep the Association forward in all that they did. On behalf of his wife, he had to return thanks. He knew that it was to her a great delight (after a long illness) to be able to be present with them the previous day. He was only sorry that he had not the opportunity of introducing her to each one of them separately, but with such a large number it was not possible to do so in the time at their disposal. He could assure them, however, that their visit had been a great pleasure to her.

Mr. A. B. BLACKBURN (Sunderland) asked to be allowed to say how sorry he was the Association were spending only three days in that district, and the pleasure it would have given the Directors of the Sunderland Water Company to have shown them over some of their works.

The PRESIDENT remarked that they hoped to have Mr. Blackburn as President on some occasion not very far off; and they would then have the pleasure of visiting Sunderland.

This closed the proceedings.

SOCIAL EVENTS.

Annual Dinner.

The Annual Dinner was held in the Masonic Hall, Old Elvet, Durham, on Thursday evening. Mr. ASKWITH presided over a company of about sixty gentlemen, among whom were the Earl of Durham, K.G., Lord-Lieutenant of the County, and several of the Aldermen and Councillors of the City.

Mr. H. E. STILGOE proposed "The County of Durham." He said they were well aware that the county was very rich, on account of the mining industry which was carried on in it. He feared he might have had great difficulty in submitting the toast, but for the fact that he was permitted to refer to the nobleman who took his title from the name of the county. His Lordship had, at some personal inconvenience, been pleased to come among them, to welcome the Association to the city, and also for the purpose of supporting their President. He considered this a kindly and gracious act; and perhaps he might be permitted to say that they were not surprised at it, because his Lordship was known as a kind neighbour and friend, a good sportsman, and a true nobleman. It was always these kindly gentlemen who were most ready to do kindly acts.

The EARL of DURHAM, who was warmly received, said he was very pleased to have had the kind invitation to be present; and he was happy that he had been able to accept it. He did not know whether they could name any profession which had done more service to the inhabitants of the country than that of the water engineers. He was delighted to think they were there, because they had selected as their President a gentleman who was so well known, and who had done so much service in the county as Mr. Askwith.

Mr. H. ASHTON HILL (South Staffordshire Water-Works Company) proposed "The Weardale and Consett Water Company;" remarking, in doing so, that he thought water companies were public benefactors. This was overlooked by the local authorities with which they had to deal. When they regarded the matter dispassionately, and considered the large area the Company supplied, the varying pressures, the engineering difficulties, and the fact that they delivered he did not know how many tons of water for a few shillings a year to a house, it must be seen what a benefit a water company conferred. He considered, therefore, that water companies who were fulfilling these ordinary functions ought not to be harassed by public authorities. He was sure the manner in which Mr. Askwith had worked bore out what he had said—that he could work much better as things were than if they were pulling different ways. They could do more with a man who had an amiable spirit, such as Mr. Askwith possessed, than if they forced things down people's throats by Act of Parliament. This was where the success of the Company largely came in.

Mr. A. F. PEASE, J.P., D.L., in response, said he quite agreed that a water company like theirs should be regarded as a public benefactor, because, if they looked back upon the past, they would find that the dividends of the Company were for a long time very small indeed.

The PRESIDENT, in calling upon Mr. Charles Hawksley to propose "The Association of Water Engineers," said that the Messrs. Hawksley had been Consulting Engineers to the Weardale Water Company since its inception, and Mr. Charles Hawksley knew more about the works than anybody else did.

Mr. HAWKSLEY, in complying with the request, said he thought perhaps the President had been stretching his conscience a little in his favour. It was true that he had known the Weardale works since their inception, and the Consett works for a great many years. It had been his pleasure, and it was the pleasure of his father before him, to be connected with both of these undertakings. He did not know why he had been asked to propose what was the most important toast of the evening, unless it was his long association with the county of Durham and its water-works, and his friendship for nearly forty years with their good President. Theirs had been an unalloyed friendship and pleasure all this time. His first visit to Durham was when his father brought him when he came down on an engineering inspection. He was then about eight years old. In the year 1847 water was taken from the River Wear, and the City of Durham was supplied in this way for a great many years, until the undertaking was purchased by the Weardale and Shildon District Water-Works Company, as it then was. This Company was amalgamated about seven years ago with the Consett Water Company. The county of Durham was served by nine different water-works. There were the Weardale, Sunderland, and Hartlepool Companies, and the great Newcastle and Gateshead Company, which supplied a very considerable portion of Durham as well as a large part of Northumberland. There were also the Darlington Corporation Water-Works; the Tees Valley Water Board, which supplied the Stockton and Middlesbrough District; the Bishop Auckland Urban District Council;

the Cleveland Water Company; and the Tynemouth Corporation, which supplied its own and neighbouring districts. Of these nine works, he was glad to say, there were still six which were in the hands of companies. He thought that places were usually better supplied by water companies than by local authorities, because the companies were well looked after by local authorities, and were constantly being urged to do their duty; whereas if the supply were in the hands of the local authority, there was nobody to look after them. He was aware that this was not the prevalent notion at the present time; but he knew that it still held good. In water-works, the great thing was to keep down waste. The Association had as President a man who had devoted much of his time to doing this, and who had kept it down; and he thought he could boast that in the Weardale and Consett districts the quantity of water consumed for domestic purposes was lower than in most places. Of course, they must not overlook the fact that the major part of the consumers were of the coal-mining class, who, although they required a great deal of water for washing when they came out of the pits, consumed, on the whole, but little water. As they had heard, there was a good deal of trouble occasioned by colliery disturbances of the ground, which not only broke the pipes but sometimes also drained the reservoirs. Turning to the position of the Association, the speaker said that, though it was founded only thirteen years ago, it had now a membership of 365. He considered that among the many things to which the Association might well devote part of its time was an examination of those small details on which the success of a water company depended. There were numerous interesting matters, as they all knew, connected with the collection of water and the large works which were required for the purpose. But the success of a water company really depended, after all, on administration—on a careful looking after small details, some of them so small as to be considered not worthy of observation. He hoped the Association would never take this view, but would always bear in mind that these small details were of the utmost consequence to the undertakings the members represented. They had questions raised by chemists and bacteriologists—questions about things being found in the water which should kill them all at once. These gentlemen apparently could not remove their eyes from their microscopes, and look round about them. If they would do this, they would be forced to make the inquiry why, if all they believed to be true were true, there was anybody alive, or why anybody ever lived. In his opinion, their views required a certain degree of question; and he thought that a number of bacteriologists were coming to be of opinion that things were not quite so bad as they thought them. Much time might be spent on the new model code of regulations. There was no doubt that a great deal of good might be done by them, though many things he should have liked to see in them were not there. They were, however, not the laws of the Medes and Persians, but were open to improvement; and he had no doubt they would, as the result of more mature deliberations, be improved in those things in which, to his mind, they were now wanting. He wished great prosperity to the Association, and hoped it would continue to do much good work for water undertakings and for water engineers. He desired to couple with the toast the name of the President, who, he believed, knew certainly as much as, if not more than, any other man living about water-works management, and not only knew it but applied it, and applied it with success and without causing irritation among consumers and those who had to be subject to the regulations which were necessary for the well-being of water undertakings.

The PRESIDENT, after thanking the company for the way the toast had been received, said he believed that the Association had a great future; but the members must keep this point before them—that they must make the Association not only useful to themselves but also to the community. They had now brought the engineers of almost all the water undertakings in the county of Durham into the Association. Some of them had been connected with it for some time; and others had been elected that day.

Mr. W. H. HUMPHREYS (York) proposed "The Visitors;" and the toast was responded to by Alderman J. BROWNLESS, son of the Chairman of the Weardale and Consett Water Company.

During the evening, excellent vocal music was furnished by the Durham Cathedral Quartette Party; and the President conveyed to them the thanks of the company for the entertainment they had provided.

VISITS TO WORKS.

Visit to Newcastle.

After luncheon on Thursday, the members travelled by rail to Newcastle, where they spent the afternoon in a visit to the offices and workshops of the Newcastle and Gateshead Water Company. They were met by the Engineer to the Company (Mr. Alfred L. Forster, M.Inst.C.E.), and by him were conducted through the meter-repairing and other workshops. Afterwards they were shown by the President (Mr. Askwith), who is Consulting Engineer to the Company, over the fittings-testing department. In the meter-repairing shop, it was explained that the Company use the meters of Messrs. Kent, of London, in three standard sizes, passing from 400 up to 60,000 gallons of water per hour; and those of Messrs. Kennedy, of Kilmarnock, of about the same capacities. There are 2788 meters in use in the district of supply. In the fittings-testing department, it was stated that, by attention to fittings and the use of approved flush cisterns, there had been effected a great reduction in the quantity of water consumed. The gross supply amounts to about 36 gallons per day per head of the population; but of this about 18 gallons only represents the domestic consumption. This is relatively high because, for one thing, in consequence of the softness of the water, no endeavour is made by the community to utilize rain water.

Tea was served to the visitors in the office. At the close of the repast,

The PRESIDENT said he had a letter from the Secretary and General Manager of the Company (Mr. George Smith), expressing his regret at not being able to be with the members, owing to a long-standing and important engagement, and adding that Mr. Alfred Forster, the Engineer, would welcome them on behalf of the Directors.

Mr. FORSTER said it had given them great pleasure to show the members through their works; and he hoped the visit would be of some use. On behalf of the Directors, he extended to them a hearty welcome. He was sorry that none of his Directors were present with him, but they were all busy men, and could not afford the time. He expressed the wish that the Association might be able to pay another visit to Newcastle on a future occasion, when they would be pleased to show them over the other parts of their works.

Mr. C. SAINTY (Windsor) proposed a vote of thanks to the Directors of the Company for their reception of the Association, and for showing the party over their workshops and offices.

Mr. F. GRIFFITH (Leicester), in seconding the motion, said they had inspected works which were a credit to Newcastle and the Engineers of the Company; and he hoped the engineers who were present would derive benefit by what they had seen. He might say that at Leicester they established a testing-station in 1887, and they had had wonderful results from it. It guaranteed the consumers a good supply of water, and at the same time reduced the consumption from day to day. He desired to second the motion on account of what the members had seen, and also because of the hospitality of the Directors. He could assure them that the members felt very grateful, and desired Mr. Forster to convey their thanks to the Directors.

Mr. FORSTER, in a few words, acknowledged the vote.

Visit to the Reservoirs of the Weardale and Consett Water Company.

On Friday, the members and lady friends went on a visit to the reservoirs of the Weardale and Consett Water Company. They travelled by special train to Stanhope, and were driven to the Waskerley reservoir, which was inspected under the personal guidance of the President. Luncheon, provided by the Directors, was served, and the party drove twelve miles to the Tunstall reservoir, where tea, provided by the President and Mrs. Askwith, was partaken of. A description of the works, by the President, is given on p. 725.

On arrival at Waskerley, the company were received by Messrs. W. E. Pease, of Darlington, and U. A. Ritson, of Newcastle, two of the Directors of the Company. Other Directors present were Dr. Hill Drury, of Darlington, Messrs. Gledstone and Scott, of Consett, and W. E. Henderson, of Newcastle. After luncheon, Mr. W. Matthews moved, and Mr. Easton Devonshire seconded, a vote of thanks to the Directors for their hospitality. The company numbered nearly ninety. The brakes were somewhat crowded; and there was some difficulty in getting them up the steep hills. However, all were in good humour, and the journeys were accomplished up to time. At both places visited, there was—thanks to the care with which the programme had been drawn up and was adhered to—ample time to inspect all that was to be seen. The weather was cold, but it kept mostly dry; there having been only one or two slight showers in the course of the day, which were not, however, sufficient to lessen the enjoyment of the party. After tea in a little chapel at the Tunstall works, a vote of thanks was accorded to Mr. and Mrs. Askwith, on the motion of Mr. Stilgoe, seconded by Mr. Hawksley.

Oil Painting of Sir George Livesey.

The Board of the South Suburban Gas Company have purchased from Mr. Edward March an oil painting of Sir George Livesey. We have not seen the painting yet; but information assures us that the Board are delighted with the work of the artist. Members of the Institution of Gas Engineers will have an opportunity of judging of the character of the work for themselves at their meeting to-day, as Mr. Sydney Y. Shoubridge has kindly arranged for the picture to be on view in the hall of the Institution of Mechanical Engineers. Perhaps some of the Boards of other Co-Partnership Gas Companies will like to become possessed of reproductions from the brush of Mr. March. Mr. March is the eldest brother of Mr. Sydney March, whose bust of Sir George was accepted for exhibition at the Royal Academy this year, and replicas of which have been purchased by various friends of Sir George.

In other parts of the "JOURNAL," reference is made to the report of the Committee for the Gas Section of the Franco-British Exhibition. In conjunction with it they have issued a pamphlet giving particulars of some of the articles lent by the various firms to the exhibit of domestic and industrial gas appliances arranged by the Committee. The printing is on one side of the paper only, to make the illustrations more effective; and the whole is enclosed in a wrapper.

NOTES FROM WESTMINSTER.

The Gaslight and Coke Company's Bill, at the instance of Mr. William Thorne, is still lingering at the third reading stage; and it is entered for its next periodical appearance before the House of Commons on Thursday. In other directions, there has not been much movement in connection with Gas and Water Bills.

Prestatyn Gas-Works. The Local Legislation Committee have decided that the Prestatyn Gas-Works should be transferred from the possession of Lady M'Laren to that of the District Council; and, as a consequence, the Provisional Order promoted by her Ladyship has been rejected—the Committee having had both Bill and Order referred to them. The principal allegation was that the management had been unsatisfactory; but, in giving their decision, the Committee expressed their opinion that the words as to the works being in a bad condition should be omitted from the preamble of the Council's Bill. There is, however, a prospect of Lady M'Laren making an effort to retain her possession of the concern in the House of Lords. In the event of her doing so, and succeeding, she is placed in the peculiar position of not having a Provisional Order to confer upon her the needed new capital and other powers. The whole of the proceedings, however—they could not be otherwise in connection with an undertaking of the position of this one—were of a small order, and call for no comment here. Those who are interested in them will find a substantial report in our "Parliamentary Intelligence."

Professional Promoters. We suppose that another prospectus will be shortly issued, headed Bungay Water Company. Mr. Preston, of Mid-Oxfordshire and Finance and Construction Company fame, to say nothing of identity with many other promotions, is interested in the Bungay Water Bill, which has passed the House of Lords, and has now passed the Unopposed Bills Committee of the House of Commons, but not until the Chairman had announced that the Committee were dissatisfied regarding the evidence as to Bungay and Harleston, though satisfied as to Eye. The Committee all through their brief investigation were curious as to the sources of the water supply; and commented on the deficiency of the evidence. We should like to ask how long Parliamentary Committees are going to allow Parliament to pave the way for professional company promoters. We take it that a Company will be promoted; and that, in addition to the promoters, the Finance and Construction Company will have something to do with getting a profit out of the laying down of the works. We merely put forward the suggestion, accompanied by liberty to Mr. Preston to use our columns for making a denial if the suggestion is groundless.

THE COVENTRY GAS UNDERTAKING.

By Charles Meiklejohn.

It seldom falls to the lot of a gas engineer to have the opportunity of demonstrating his real capacity as a constructional engineer, the soundness of his judgment in the proper use of the material at his disposal, or his ability to determine, with some regard to accuracy and precision, the amount of plant and capital expenditure required to construct a brand-new works capable of producing the whole quantity of gas required by the district over which he has control, and at the same time make ample provision for future extensions without unduly hampering the undertaking by excessive expenditure. But such an opportunity came to Mr. Fletcher W. Stevenson, M.Inst.C.E., at Coventry; and the formal opening last Thursday of the new gas-works at Foleshill,* where the whole of the gas required by this historic city and neighbourhood is now being made, gives one ample evidence of how far the completed result accords with Mr. Stevenson's own desires, or justifies the expenditure which has been incurred and the expectations of his friends.

The first impression the buildings and plant make on a visitor is their extreme neatness; and, although presenting little of an ornate character, they suggest a splendid adaptability for the purpose for which they were erected. Permanence and efficiency are the dominant features of the work. The second impression one has is in the quietude of the place. The mechanical appliances for the transport of materials to and from the works (the lack of which at the old works proved so serious a handicap), and the application of machinery for the charging and discharging of the retorts, have so reduced the number of hands employed that it was difficult to believe that the majority of the men were not still labouring away at the old site, or that the whole of the output was being made and sent out from Foleshill. [I understand that the men whose services were dispensed with as unnecessary under the new conditions received pensions or allowances satisfactory to them and no less creditable to the Corporation.]

That the works have been designed, erected, and so well equipped at a total cost of £194,000, which works out at something less than £190 per million cubic feet of capacity, surely entitles Mr. Stevenson to the entire confidence of his Committee and the Corporation (which he assuredly possesses), and to the sincere congratulations of his friends. By the kindliness of his character, and a ready accessibility to his colleagues in the Midland district, Mr. Stevenson has always stood high in their esteem; and he has done at Coventry no more than was expected of him in proving his title to the definition of a true engineer laid down in the opening address of the late Mr. James Mansergh, at the Science Congress held in Glasgow some years ago, who suggested, if he did not state it in so many words, that the true engineer was the man who made the best of the materials at his disposal, in the attainment of the desired end at the least possible cost.

I cannot, however, overlook the fact that the results of the last twenty-five years' working of the Coventry Gas Department are not likely to be cited as a proof of the desirability of municipal control. On the contrary, they are meagre and unsatisfactory, due in part, and in the first instance, to the high capital cost of £920 per million, but more to the utter unsuitability of the site of the works, which has been a constant source of increased cost and much loss. Less than £2000 per annum alone represents the surplus profits of the Department, which has now a capital value of nearly half-a-million sterling. This is surely meagre enough, but it would not have been so unsatisfactory if, instead of misappropriating £49,614 to the rates, the whole of the amount had been used to reduce the price of gas, which has been maintained at an unduly high rate. It could not have been present to the mind of his Worship the Mayor (Alderman Lee, J.P.), who, in opening the works, spoke of dividend-paying gas companies who thought well of their shareholders but did not give much consideration to the ratepayers, that there was on his doorstep, so to speak, a dividend-paying gas company, one-fifth the size of Coventry, who paid 10 per cent. dividend to the shareholders in 1882, and have paid an increasing dividend ever since, and yet are supplying gas to slot consumers and to the smaller ordinary consumers (which together in Coventry represent more than half the total output) at 5d. per 1000 cubic feet less than Coventry.

It is a matter, then, of no small concern, at the present moment, to the gas consumers of Coventry as to what the majority of the Corporation will do when the gas-works at Foleshill justify their existence by greatly enhancing the remunerative character of the Gas Department, and place at the disposal of the Council a constantly increasing surplus. After due provision is made for writing off the capital value of the disused works, will the surplus be used to relieve the unjust surtax on the smallest consumers (and therefore the most deserving of ratepayers) which they have had to bear for twenty-five years? Will the Engineer be disheartened by seeing the results of his work diverted to other than its legitimate channel? And will not the Chairman and members of the Gas Committee still be liable to have the finger of scorn pointed at them if this unjust impost is maintained to provide the spending Committees of the Corporation with something to play with?

I congratulate Mr. Stevenson on the completion of his works, and the Gas Committee on their possession of them; and I can only hope that when the results of his and their labours come to hand in improved working and greater financial success (which assuredly will follow), the policy of the majority of the Corporation will be, not to travel down the broad road which leadeth to —the misappropriation of gas profits! but to rise to the higher plane of equity and justice.

* See p. 716.

Radiation and Temperature of the Bunsen Flame.—According to a recent communication to the "Comptes Rendus," the flame of a bunsen burner made luminous and electrically conductive is not modified perceptibly from the point of view of its emissive power or of its absorbing capacity for the residual rays of fluorine, and consequently its temperature. There is no proportion between the electric conductivity of the flame and its optical properties relatively to rays with a wave length $\lambda = 25{\cdot}5$ microns. Temperature seems to be the only essential factor in the emission of ray spectra by flames.

Sterilization of Water by Ozone.—At the recent Internationa Congress of Applied Chemistry, Dr. Bermat, the Chemist to the Hygienic Bureau at Nice, contributed a paper in which he gave the results obtained at the Bon Voyage works in that city, with an installation capable of dealing with a supply of about 4 million gallons of water per 24 hours by means of an Otto apparatus. The ozonized air and the water were mixed in such a way as to produce a fine emulsion. As little as one milligramme of ozone per litre of air will produce sterilization, if a sufficiently large quantity of air be used. The organic matter present in the water paralyzes the germicidal action of the ozone. The smallest effective quantity of ozone required for every 200 gallons of water is 0·33 gramme. The water after treatment has no bactericidal properties.

The Recent Extensions at the Cologne Gas-Works.—In the course of the article on "Recent Extensions at the Cologne Gas-Works" which appeared in our issue of the 1st inst., and which was translated from the "Journal für Gasbeleuchtung," we stated (p. 581) that the coal raised from the store by grabs is either transferred to an iron band conveyor, which runs along the north wall of the store, or to an electric line on the south side of the store, which transfers it to "transverse band conveyors" which take it directly to the breakers erected in front of the coal-store. Messrs. Head, Wrightson, and Co., Limited, of Thornaby-on-Tees, write asking us to point out that these transverse conveyors are not ordinary band conveyors, but are the "Marcus" propulsion trough conveyors. They have been constantly at work since the year 1905, and give great satisfaction.

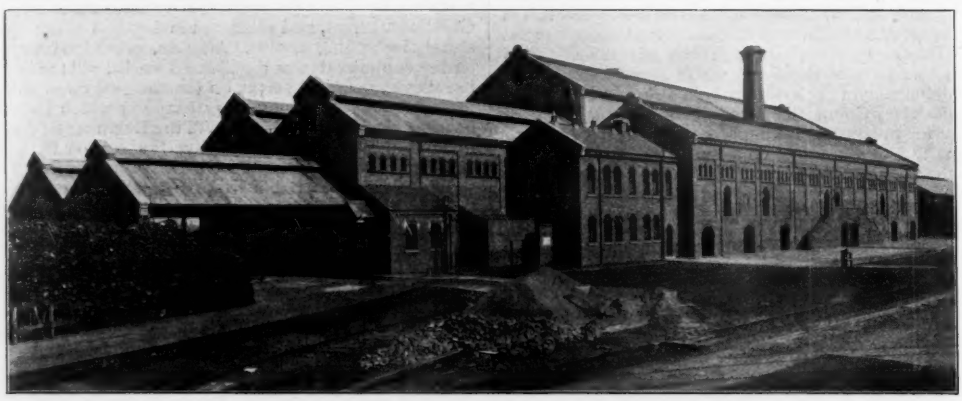
COVENTRY CORPORATION NEW FOLESHILL GAS-WORKS.

Formally Inaugurated Last Week.

THE formal inauguration took place last week of the new gas-works of the Corporation of Coventry which have been erected at Foleshill to the designs, and under the superintendence, of their Engineer, Mr. Fletcher W. Stevenson, M.Inst.C.E. The scheme was fully explained in the "JOURNAL" for May 8, 1906 (p. 365), when a number of photographs were given showing the progress that was then being made with the work. A plan of the works also accompanied that article; and to this readers may be referred, as the alterations since made in the scheme are not such as to necessitate the reproduction here of a revised plan. We are, however, in a position to supplement the information that was given at that time by the following complete particulars of the works, which were circulated, in the form of a souvenir pamphlet, among those who were present at the inauguration. And in following this description aid will be derived from the series of excellent photographs which accompany it, and for which we are indebted to Mr. Stevenson.

The gas undertaking was acquired by the Corporation in the year 1884; the purchase price being agreed with the Gas Company at £170,345. For that year the gas output was 185 million cubic feet; the capital therefore working out at the rate of about £920 per million. The growth of the undertaking is shown in the fact that for the year ended March 31 last the output of gas was 796 million cubic feet, and the capital expended £454,823; being at the rate of £572 per million. The first year after the purchase, a surplus profit was made of £309; and never at any time has the undertaking been subsidized out of the rates. On the other hand, a total amount of £49,614 has been transferred to the credit of the general district fund from the surplus profits made by the Gas Department. The average price charged for gas in 1884 was 2s. 11½d. per 1000 cubic feet; and during the year ended March 31 last, it was 2s. 3d. per 1000 feet. The large increase in demand for gas which steadily went on after the Corporation had acquired the undertaking, necessitated more plant being laid down for its manufacture, until the site of 4½ acres upon which the works stood became so congested that it was apparent another site must be obtained. Hence the purchase was arranged of the site at Foleshill, and the Gas Act of 1898 obtained by the Corporation, giving the necessary powers for building a works thereon. Building operations were commenced on the site in the year 1902; and, with the exception of works offices, they were practically completed last year—1908. The old works were closed for the manufacture of gas at Whitsuntide of this year; and the whole supply will now be produced at the Foleshill works.

The Foleshill site is not an ideal one for a gas-works, though the best one at the time reasonably available for the designed purpose. Regarding its characteristics, it is nearly 40 acres in extent; but it is not by any means a shapely piece of land—in fact, its irregularities defy the application of any ordinary term that would adequately describe it. It has only a frontage of 120 feet for a main entrance on the Nuneaton Road. Continuing to the right hand there is a frontage of about half-mile on the Coventry Canal. Then across the site, at the farther end of it, runs the Coventry and Nuneaton branch of the London and North-Western Railway, severing the odd 7 acres or so from the main 30 acres. This 7 acres is at a higher level than any other part of the site. Then, on the farther side from the canal, part of the land juts out centrally from the main body of the site. Accompanying these drawbacks, too, were considerable variations in the levels—in one part, of something like 22 feet. These differences necessitated, in levelling, the taking off and filling in of some 150,000 yards of spoil. There was, in fact, a great deal of heavy preparatory work to be performed, which, now that the site has been developed and brought to a uniform level, is apt to be lost sight of.



Retort-House and Coal Stores.

Immediately the works are entered, on the right hand side is a group of buildings which constitute the weighbridge office, a governor-room for dealing with the supply of gas to the immediate district, and an exhauster-house, in which is housed the plant for sending the gas from Foleshill to the Gas Street holders. Fronting the road, with an entrance from the works, is the workmen's canteen, 60 feet by 20 feet, with a store-room below. The works being 2½ miles from the city, many of the men remain for meals, which are supplied at a fixed tariff; and a Committee of the men manage the commissariat department. On the opposite side of the entrance are the carburetted water-gas plant buildings; the plant having been removed from the old works, and erected here in an improved state. The relief gasholder, oil-tank, tar storage and overhead tar-loading tanks, and all the necessary equipment, are in the immediate neighbourhood.

Starting from the entrance, passing the front of the water-gas plant, and running the full length of the site to the railway sidings at the opposite end, is a main road, separating the part of the site devoted to the production from the purification and other processes. The road is 40 feet wide, finished in macadam, with footpath, stone kerb, and channels, drained into an 18-inch diameter barrel sewer running down the centre alongside a 9-inch foul sewer. The surface water from the whole of the site is collected in this main sewer, carried to filter-beds, and, after filtration, is turned into the stream which crosses the site in a culvert, and passes under the canal. In the main road are laid the large mains, carrying the gas from the water-gas and the coal-gas plants to the gasholders—the tar, liquor, gas, water, and other smaller pipes being laid under the footpath.

On the east side of the main road, between the latter and the canal, are situated the retort-house and coal-stores, with the stokers' mess-room and lavatories adjoining, and the condensers on the side of the coal-stores facing the canal. The plan provides for two more retort-houses equal in capacity to the one already completed. At the end of the retort-house nearest the main entrance, a coke-yard of ample area has been formed for the tipping, storing, crushing, screening, and loading of coke. A portion of the coke-yard, about 120 feet long by 100 feet wide, has been covered by a steel roof in three spans on cast-iron columns. Parallel with the retort-house, on either side of same, and running the full length of the coke-yard, is a sunk dock for railway waggons, to facilitate the loading-up of coke to be despatched by rail. These docks are 5 feet deep below the yard level, and have easy inclined entrances connected to the railway siding, which runs completely round the site. Crossing the main road is next seen the strongly built retaining wall, commencing at the water-gas plant end, and returned round the corner of the land extending from the main part, in the shape of a letter L. The coping of this retaining wall is at the original level of the ground. Along the shorter or south side of the retaining wall are the workshops and stores, with the workmen's conveniences in close proximity. In a line with the workshops, with one end abutting on the main road, is a block of buildings, comprising the Works Manager's office, pay and general offices, laboratory, and coal-testing works, situated practically in the centre of the works, instead of at the entrance, as is usually the case. In this block is a large office for the Engineer, which will also be used for the Committee at their periodical visits to the works. A space between the offices and retaining wall is covered with a glazed roof, to afford shelter for the workmen during inclement weather at pay times. Facing the offices and workshops, and separated from the latter by a branch road 75 feet wide, are the exhauster, hydraulic and electric power, and boiler houses, with ample accommodation reserved for future extensions. Thus it will be noticed that

the plan provides for the whole of the machinery being concentrated near the Works Manager's office, so as to be constantly under his eyes. Continuing along this branch road, beyond the boiler-house are the washers and scrubbers, an underground liquor churning tank, and, adjoining the boiler-house, a pump-house and overhead tank for supplying liquor to the washers. At the end of the branch road stands the locomotive engine shed, and alongside the latter a water-tower, in the upper storey of which is housed the water-softening plant.

Next to the engine-houses are the water-gas and coal-gas purifiers and revivifying sheds, each section having its own meter-house abutting on the main road. Ample room adjoining is reserved for boxes and sheds for future extensions. Beyond the purifiers a branch road 30 feet wide leads to the chemical works and filter-beds, with a large underground tar and liquor storage tank at the corner. Upon the covering of this tank is built a pump-house, carrying an overhead measuring tank, for loading tar into tank-waggons and barrels. Here are housed the tar-pumps and pumps for delivering liquor to the various positions required on the works. Following the main road to the railway, and crossing to the opposite side, the gasholder station is reached. Here are two four-lift gasholders, each of a capacity of 1¾ million cubic feet. Between the gasholder ground (for the intention is to use this 7 acres for storage only) and the main works, a subway for gas-mains has been constructed under the railway. A valve-house, commodious enough for the valves of all future holders, has been built; also a cottage for the gasholder attendant. At the far end of the site, alongside the railway, is a piece of land having an area of about 2⅓ acres, which in the Corporation's Act is not scheduled for the manufacture or storage of gas, and so has been reserved for workmen's cottages.

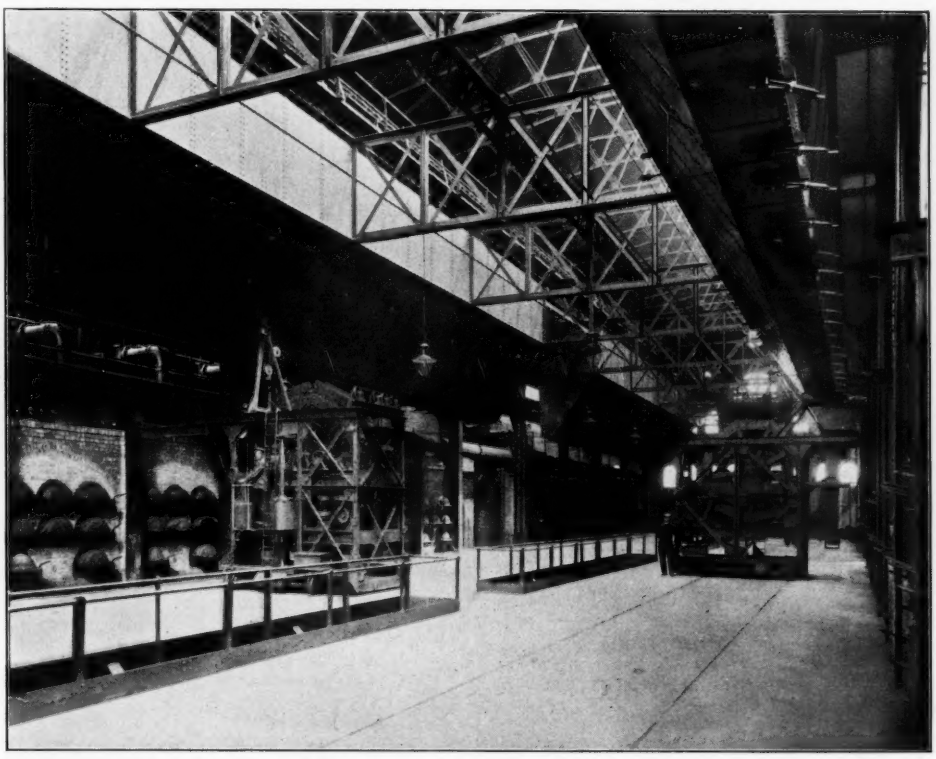
DESCRIPTIVE PARTICULARS OF BUILDINGS AND PLANT.

Railway Sidings and Canal Wharf.

There is a siding off the Coventry and Nuneaton branch line of the London and North-Western Railway Company, which has been constructed by them, at the expense of the Corporation, especially for these works. From this the works sidings make a complete circuit of the site—giving upwards of a mile of main sidings—with branches leading to various parts of the works, making, for the first section only, about 2 miles of sidings. There is a weighbridge with weigh-office for waggons entering the works, and another for out-going traffic. Alongside the canal, a wharf has been constructed giving accommodation for four boats; and near this it is proposed to erect measuring tanks for loading tar into boats. A branch siding, with an inclined way at each end, runs alongside the wharf; and the side-tipping waggons used for moving coke, ashes, &c., on the works deliver direct into the boats. At the present time, the one locomotive on the works is fully employed.

Retort-House.

The retort-house has a capacity of 4 million cubic feet of gas per diem, and is practically a steel building with galvanized iron



Interior of the Retort-House, Showing the Stoking Machinery.

roofs, only the outside walls and gable ends being of brickwork. It has a total length of 220 feet, and is 130 feet wide, in three bays; the central bay between the settings being 50 feet wide and 69 feet high to the apex of the roof. The side bays covering the retort-benches and coke-floors are 40 feet span and 47 feet high to the apex of the roofs. From the measurements given, it will be seen that generous working space is provided for the men. Along the apex of each roof is a wide, open ventilator on the side bays, being immediately over the discharging side mouthpieces; thus ensuring cool and airy working stages. A novel feature of the house is that the main stanchions starting from the basement (yard level) finish at the level of the body part of the overhead coal-hoppers; and being 21 feet apart, they act as buckstays for alternate retort-beds. Each stanchion carries the end of a main cross girder 7 ft. 6 in. deep, open lattice in the centre, and plate web at the ends, which run through the hoppers, forming a side thereof. The coal-hoppers, 9 feet wide and 16 ft. 6 in. deep, are continuous for the length of eight beds, and contain 48 hours' supply. They are carried entirely by the cross girders, of which the centre lattice portions only are visible. The hoppers below the girders taper on each side to a width of 2 feet. Sliding doors along the bottom, over each tier of retorts, are opened and closed by levers actuated by the charging machine. Above the coal-hoppers, the main stanchions are continued in a light lattice form to carry the centre bay of the roof. The side-roofs are carried by brackets on the main stanchions at one end, and supported on the side walls of the house at the other. The stage floors are 12 feet above the ground level, constructed of steel reinforced concrete with granolithic finish; and the centre bay is entirely devoted to the machinery for charging and discharging—the whole work being done from one side of the bench.

There are four retort-benches arranged in two rows, the chimneys—one to each row—being in the centre between the ends of the benches. Each bench consists of eight beds of eight 20 feet horizontal retorts, 22 in. by 16 in. ⏢ shape, heated on the Klönne regenerator system. The house, therefore, contains 256 through retorts, each carrying a charge of 7 cwt. The retorts are discharged and charged at one operation by two Fiddes-Aldridge simultaneous stoking machines; each machine working one line of two benches. The power for travelling and operating the machines is electricity, conveyed to the motors through a short trolley arm from two overhead bare cables, running the length of the house alongside the coal-hoppers. On the retorts being discharged, the coke falls through openings in the side stage-floors into hoppers or cages below, where it is quenched. These cages have doors in the front, which, when opened, allow the coke to discharge into side-tipping waggons on a narrow-gauge railway, to be hauled to the coke-yard by an endless wire rope. The result of this system is good coke, bright and clean, owing to the little knocking about that it receives.

The ascension-pipes are 8 inches in diameter, on the discharge side only, fitted with "Darwin" patent arch-pipes and hydraulic liquor-seal. At the ends of the benches are placed the tar-towers, to automatically separate the tar and liquor running from the

hydraulic mains. The latter are in sections of one bed length, each having a 10-inch diameter gas outlet branch and valve, leading to a 20-inch diameter cast-iron collecting-main. From this collecting-main, the gas from each bench of retorts travels into a 24-inch diameter steel foul-main, through two 10-inch diameter branches, upon each of which is placed a governor, arranged on a platform carried by the bench cross binders. Two 24-inch diameter steel foul-mains travel up and down the house, and join at the coal-store end into a 30-inch diameter main leading to the condensers. Immediately before the condensers are two 24-inch "Everitt's" tar-extractors and a blow-off box, having 8-inch diameter connections, for use when gas-making is suspended on Sundays, or at any other time during alterations.

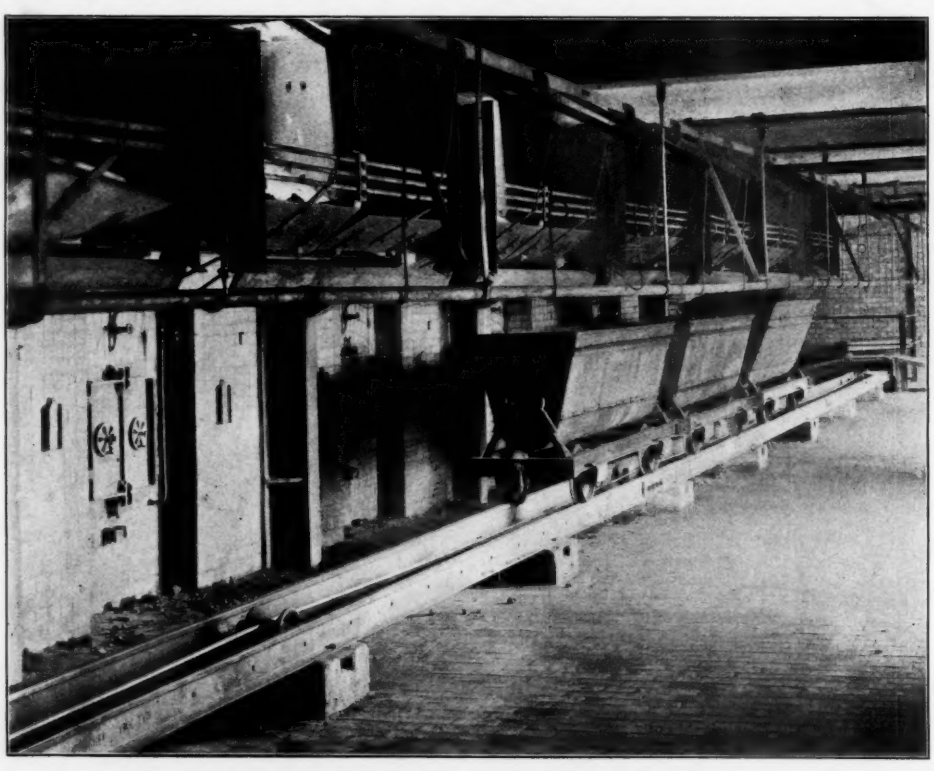
Alongside the coal-store, facing the main road, and having an entrance leading from the retort-house stage-floor, are the stokers' mess-room, lavatories, and conveniences. The lavatories on the ground floor contain two baths and three lock-up drying rooms for the stokers' working clothes (one room for each shift), heated by steam-coils. In the mess-room each man is provided with a roomy and well-ventilated locker, made of expanded sheet metal.

Coal-Store and Coal-Handling Plant.

The coal-store at the north end of the retort-house is 100 feet long, 68 feet wide, and 32 feet deep, and has a capacity of 5000 tons. Adjoining the store, and covered by a steel roof, is the coal-breaker pit and hopper, over which a branch siding runs from the inlet line of rails to the siding for empty trucks and outward traffic. Coal-trucks are hauled by hydraulic capstans on to two waggon-tippers, also worked by hydraulic power, placed on either side of the hopper. The back axle of the truck is caught in a fork and raised until the floor of the truck makes an angle of about 45° to the horizontal; the front wheels also being raised about 10 inches by another ram, to enable the buffers to clear the rails. The coal is then discharged into the hopper, through the end door of the waggon. The tipping-rams are fixed in the side extensions of the breaker pit.

From the hopper the coal falls on to a jigging-screen, and the large coal passes over and goes through a breaker. The coal is then delivered, by means of a bifurcated shoot, on to either of two short inclined tray-conveyors, which discharge the coal into the fillers of the two main gravity bucket conveyors. From the breaker-pit, the two lines of conveyors rise vertically to the top of the coal-store, travel horizontally the length of same into the retort-house, then rise again and travel the whole length of the house over the coal-hoppers. The coal may be tipped into the coal-stores or into the hoppers as required.

At the end of the retort-house, beyond the hoppers, are fixed the electric motors for driving the two main conveyors—one motor of 20 H.P. to each line. Here the conveyors commence to return by descending the retort-house wall, running under the stage-floor, and then along two subways under the coal-store, back into the breaker-pit. When necessary to pick up from any part of the store, the conveyors are automatically fed through shoots in the roofs of the subways, delivering into the filler of the conveyor. The coal-breaker, jigging-screen, and two short tray-conveyors in the breaker-pit, are driven by a 50 H.P. horizontal steam-engine placed in a house adjoining the end of the coal-store.



Interior of the Retort-House, Showing the Coke-Cages and the Wire-Rope Tramway.

By means of this plant, 80 tons of coal per hour, with the conveyors running at a speed of 45 feet per minute, can be placed in the retort-house overhead hoppers or into the store.

Coke Hauling and Screening Plants.

The two narrow-gauge tramways, running alongside the retort-benches in the basement of the retort-house, are continued in parallel lines across the coke-yard. Each line rises by two easy inclines to a gantry carried on columns 29 feet above the yard-level, from which the coke is tipped. One gantry is 324 feet long, the other a few feet shorter. The coke-yard covers an area of over 1½ acres, and is paved entirely with granite setts on a good solid foundation, to meet the unusually heavy traffic. Side-tipping trucks, coupled together in numbers of three or four, are hauled up the incline and along the gantry by means of an endless wire rope, which returns overhead to the winding drum in the engine-house, situated in the basement of the retort-house. A 30 H.P. gas-engine drives this plant. To guard against the possibility of trucks running back down the incline into the retort-house, safety catch-points are inserted in each line of rails.

The plant for breaking and screening the coke is placed under the covered area of the coke-yard, and is driven by a horizontal steam-engine in a house adjoining. Coke is tipped into a shoot at ground-level, passed through a breaker, and raised by an endless chain bucket elevator, which discharges the coke into a shoot delivering into a revolving screen. Underneath the screen are hoppers with sliding bottom doors to collect the various sizes of coke and breeze.

Condensers.

Situated along the east side of the coal-store are the condensers, of the atmospheric vertical pipe type, arranged in four batteries, each consisting of 88 vertical 9-inch diameter pipes, 27 feet high. The condensers can be assisted if necessary by means of water sprayed from perforated pipes running along the tops of the batteries. From the condensers, a 30-inch diameter main underground carries the gas across the site to the exhauster-house.

Exhausters.

The exhausters are of the Bryan Donkin twin type, in duplicate, each of 160,000 cubic feet per hour capacity.

Hydraulic Power Plant.

The horizontal tandem hydraulic pressure steam pumping engines consist of two steam cylinders 17 inches diameter, and 20 inches stroke, and four rams 3¾ inches diameter, and 20 inches stroke. With 75 lbs. steam pressure, and running at a normal speed of 50 revolutions per minute, they are capable of delivering 150 gallons of water per minute against an accumulator pressure of 750 lbs. per square inch. The ram of the hydraulic pressure

Coke Yard.

accumulator has a stroke of 18 feet by 18 inches diameter, giving a capacity of 198 gallons.

This accumulator supplies the pressure to the two coal-waggon tippers, each capable of lifting a waggon weighing 20 tons at a speed of 26 feet per minute; to the platform lift in the retort-house, having a lift of 12 feet; to the two "turnover" capstans for hauling railway waggons on the sidings, each capable of hauling a load of 100 tons along a level railroad at a speed of 200 feet per minute; and to a 15 cwt. platform lift in the carburetted water-gas generator house. The exhaust water from all the working cylinders returns to an overhead tank in the engine-house, to which the pump suctions are connected.

Boilers.

For supplying steam to the engines, &c., of the coal-gas plant only, three Lancashire boilers are provided, 30 feet long by 7 ft. 6 in. diameter, fitted with Meldrum's forced-draught furnaces. At the present time, the feed-water is heated by means of a Berryman exhaust steam-heater, fixed at the rear of the hydraulic power house; but provision is made at the back of the boiler-house for the installation of a fuel economizer of the "Green" type. The boiler feed-water pumps are placed in the pump-house adjoining.

Washer and Scrubber-Washer.

The former is of the Livesey type, and the latter of the Holmes rotary type, each of a capacity of 4 million cubic feet per diem. Tar and liquor from these two washers gravitate to an underground tank of 81,000 gallons capacity. From this tank, the liquor is pumped into an overhead tank, and circulated until it attains about 10 oz. strength, suitable for transfer to the chemical works. Beyond the scrubber is another Livesey washer, in which the gas is brought into contact with a light solvent oil, thereby removing a large percentage of the naphthalene present.

Purifiers.

The purifiers and revivifying sheds for the water-gas and the coal-gas plants are adjacent to each other; space being reserved for doubling the capacity of the former, and for three more similar sections of the latter. For the water gas there are six boxes, each 30 feet long by 25 feet wide, and having four covers 12 ft. by 9 ft. 6 in. The first two, for oxide, are fitted with Jäger grids; and the last four, for lime purification, with ordinary grids. In the coal-gas section there are six boxes; the first four being 50 feet long by 30 feet wide, fitted with Jäger grids, each box having eight covers, 12 ft. by 9 ft. 6 in. These boxes are used for oxide, and are worked in rotation, by means of a 24-inch diameter "Weck" centre-valve. The last two boxes are each 60 feet by 30 feet, fitted with ordinary grids for lime purification; the covers, ten to each box, being 12 feet by 9 feet.

All the purifier covers are screwed down with eye bolts and nuts, and the joints made with a flat strip of first-class rubber, secured with loose copper rivets. For lifting, removing, and replacing the covers, a Hovey patent manual crane is employed, one on each section, travelling on rails carried on brackets attached to the sides of the boxes. The purifiers stand in the open. The revivifying and lime sheds alongside are 60 feet wide; the roofs, in two spans, being carried on cast-iron columns.

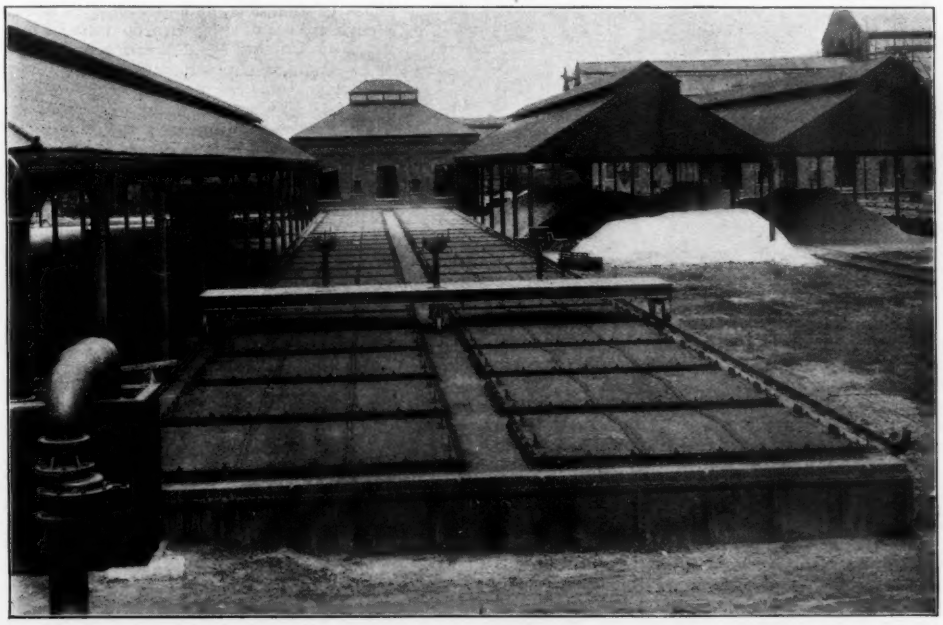
Meter-Houses and Meters.

Houses for the station-meters of both the water-gas and coal-gas plants, are, at the ends of their respective sections of purifiers, abutting on the works main road. In the former, there is one meter of 60,000 cubic feet per hour capacity, removed from the old works; and space is allowed for another meter of a similar size. In the coal-gas meter-house there are two meters, each to pass 80,000 cubic feet per hour—one new, the other brought from the old works. In the re-erection of this one, a larger drum has been fitted by the makers, Messrs. Parkinson and W. & B. Cowan; its original capacity having been 60,000 cubic feet per hour.

Tar and Liquor Storage Tanks.

Hereabouts one gets a good idea of the depth of the dip which has been dealt with, almost in the centre of the site. Reference has been made to the heavy amount of levelling carried out; and there would have been little use in filling up and then excavating again for the construction of the underground tar and liquor tanks. Advantage has been taken of the low ground at this point, by building the walls of the first tank from the solid ground, and then filling up around it. The walls and bottom are constructed of concrete, with brickwork lining, and a layer of asphalte between. It may here be stated that this system of lining has been adopted for the coal-breaker pit and the other underground tanks on the works.

This first tank is 100 feet long by 50 feet wide and 15 feet deep,



Purifiers and Revivifying Sheds, with Station-Meter House in the Distance.

and will hold 450,000 gallons of tar and liquor. Another extensive space has been left unfilled, for the construction, in a similar manner, of the next tanks, without having to incur the expense of any considerable excavation.

Gasholders.

The land allocated to storage is sufficient to accommodate holders of a total capacity of 15 million cubic feet. Two holders have already been erected, 150 feet in diameter, and of four lifts of 30 feet deep each; their joint capacity being 3½ million cubic feet. One of the four lifts is made to rise beyond the framing, after the lead given by the late Sir George Livesey; and plate standards, and flat wind-ties, back and front, also on the Livesey plan, have been adopted. The tanks are constructed of concrete (concrete material being very cheap), lined with asphalte, with an inner facing of brickwork.

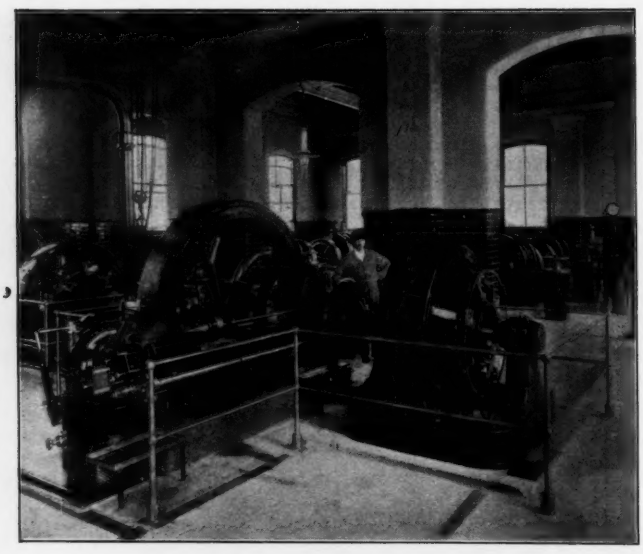
Nearby a valve-house has been erected, containing the valves for the two holders (connections are left for three more), and a safety bye-pass governor between the inlet and outlet mains. A vertical steam-boiler is permanently fitted up for use in winter, to prevent the freezing of the hydraulic cups. With the existing holders at the old works, the total storage capacity is 5 million cubic feet. From the gasholder valve-house the outlet-main passes under the railway, alongside the inlet-main, in the pipe-subway, then crosses over to the canal, the line of which it follows to the works entrance into the driving main exhauster-house.

Driving Main Exhauster-House.

In the driving main exhauster-house is installed a rotary exhauster driven by a 23 H.P. gas-engine. With a 3-inch inlet pressure, and against a 20-inch pressure at the outlet, this plant will drive 250,000 cubic feet of gas per hour through the 24-inch diameter main laid along the Foleshill Road to the gasholders at the old works, about 2½ miles distant, from which the gas will then be distributed to the various districts in the city.

The Carburetted Water-Gas Plant.

The carburetted water-gas plant, housed in a range of buildings near the works entrance, has been removed from the old works, and is capable of producing 1¼ million cubic feet per diem. The buildings are divided into generator, boiler, pump, and machinery houses; and in the three latter space has been provided for the possible duplication of the plant. During the summer months, the plant is not in use; and for closing the fronts of the boiler and generator houses, steel revolving shutters are provided, raised and lowered by chains, such as are used in tram-stations. The

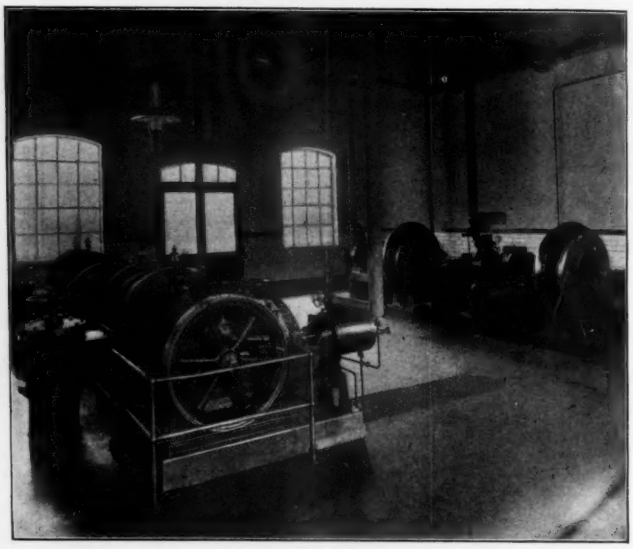


Electric Generating Plant.

plant consists of two generators, two carburettors and superheaters with fire-brick linings, two washers, two scrubbers, two water-cooled vertical tube-condensers, and a final scrubber. Around this part of the apparatus an iron staging is provided for coking and operating the plant; the coke being raised to the stage-floor in buggies, by a platform hydraulic lift, having a rise of 16 feet.

There are two Lancashire boilers, 26 feet long by 6 ft. 6 in. diameter, and exhaust steam-feed water-heater; two steam-turbines, coupled direct with flexible couplings to two blowers, controlled by a cut-off gate, each set capable of supplying the required blast to the whole of the plant; two sets of Bryan Donkin gas-exhausters and steam-engines, each capable of passing 60,000 cubic feet of gas per hour; two tar-separators, 20 ft. by 8 ft. by 6 ft. deep; two oil-pumps for feeding the superheaters; two 2½-inch single-ram 5-inch stroke "Cameron" boiler-feed pumps; two 7-inch single ram 5-inch stroke "Cameron" water-circulating pumps; one 5 in. by 3 in. "Reliable" tar-pump; and one 5 in. by 3 in. "Challenge" pump, for unloading the oil-tank waggons and delivering into the store-tank.

Outside the buildings there are two sunk circular water-tanks, 30 feet diameter, and 10 feet deep. The water is pumped from No. 1 tank into an overhead tank. From this it gravitates through the washers, scrubbers, and separators, into tank No. 2, where it cools. The pump suction is then changed over, and the water again circulated, returning to tank No. 1. Close by, is the relief gasholder, 60 feet in diameter, with two lifts, each 20 feet deep, having a storage capacity of 200,000 cubic feet. An underground tar residuum tank has its position marked by four columns and a stage carrying another tank, into which the tar is pumped from the underground tank, to be loaded into tank-waggons on the siding alongside. Near to these a brick basin has been constructed of a size to accommodate two steel circular oil-storage tanks; the intention being to save the oil getting away should



Blowers, Turbines, and Exhausters for the Water-Gas Plant.

the steel tanks spring a leak. One oil-tank has at present been put in, having a capacity of 120,000 gallons. The oil-pipes are laid in trenches to facilitate access.

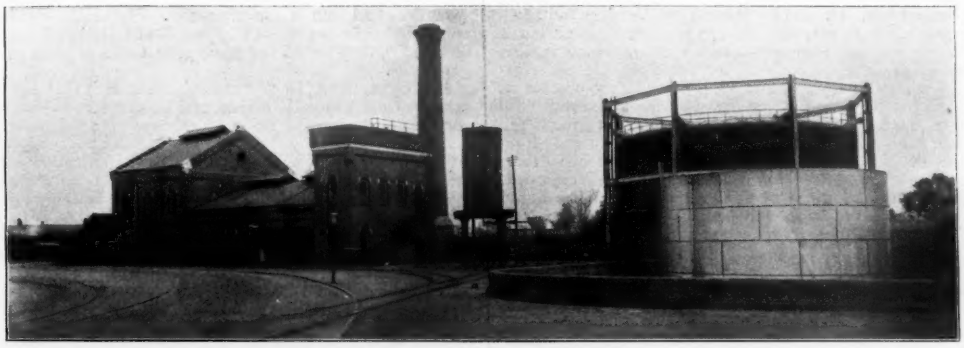
Chemical Works.

The chemical works have been in operation for about four years, and comprise a sulphate of ammonia plant and an acid works. The buildings are arranged so that extensions can be made at the minimum of cost, to enable the plant to deal with the whole of the liquor that will be produced when, in the future, the scheme of these works is consummated—that is to say, when they are equal to an output of from 15 to 16 million cubic feet of gas per day. Originally, the plant was used for the manufacture of sulphate of ammonia, and had an open fishing saturator and a capacity for dealing with 60 tons of liquor in 24 hours. Recently owing to the depression in the market for sulphate of ammonia, the plant, with slight alterations, has, with highly profitable results, been converted to the process of purifying and concentrating the ammoniacal liquor, for which there is at present a good market. If at any time it should be desirable to revert to the manufacture of sulphate of ammonia, the plant can readily be adapted.

Turning to the sulphuric acid plant, which has a capacity equal to treble the present requirements, this is very compact, and one of the smallest built in connection with a gas-works. The acid is made from spent oxide, and used in the manufacture of sulphate of ammonia. Near the sulphate works, a circular underground liquor storage tank, 50 feet diameter and 14 feet deep, receives the strong liquor from the washers and scrubbers. It has a capacity of 150,000 gallons.

Water-Tower and Well.

For the works, a plentiful supply of water is obtained at the well close by the chemical works. Horizontal steam pumping-engines, in duplicate, placed in a house over the well, raise the water into a cast-iron tank at the head of the water-tower, situated at the end of the road beyond the scrubbers. The height of the tank above the works level is 50 feet. It has a capacity of 26,000 gallons, and is constructed so that it can be doubled in depth when necessary. The well water is much too hard for immediate use at the boilers; and in the upper storey of the water-tower a "Bruun-Lowener" water-softening plant has been installed, capable of dealing with 2500 gallons per hour, and reducing the hardness from 26° to 6°. For drinking purposes only, North Warwickshire Water Company's water is used.



Carburetted Water-Gas Plant.

Workshops and Stores.

Roomy and well-equipped blacksmiths', fitters', and carpenters' shops are provided in the centre of the works, built in line, with large doorways between each shop. A branch from the railway siding alongside runs into the building, and heavy loads can be picked up from waggons, and moved to any of the shops, by means of an overhead crane, travelling the full length of the building. At one end of this range of buildings is the works stores, and at the opposite end a powerful mortar mill driven by a 23 H.P. gas-engine. During the erection of the new works, the workshops have been of great service; a large amount of work having been executed by the Corporation's own men.

At the end of this sketch of the new gas-works, it may be remarked, that, though considerable expense has been incurred in developing the site, throughout their design economy has been combined with substantial construction and efficiency; and as the business of the department progresses, the previsions made on the site will ensure extensions being carried out at the lowest capital cost. Henceforth, working under the new conditions, both the department and the consumers must (the markets for materials being favourable) before long enjoy the benefits of the more economically produced commodity. Further than this, the removal of the manufacturing part of the works from the centre of the city will be of great advantage to the inhabitants.

The following is the official list of the Contractors engaged on the new works:—

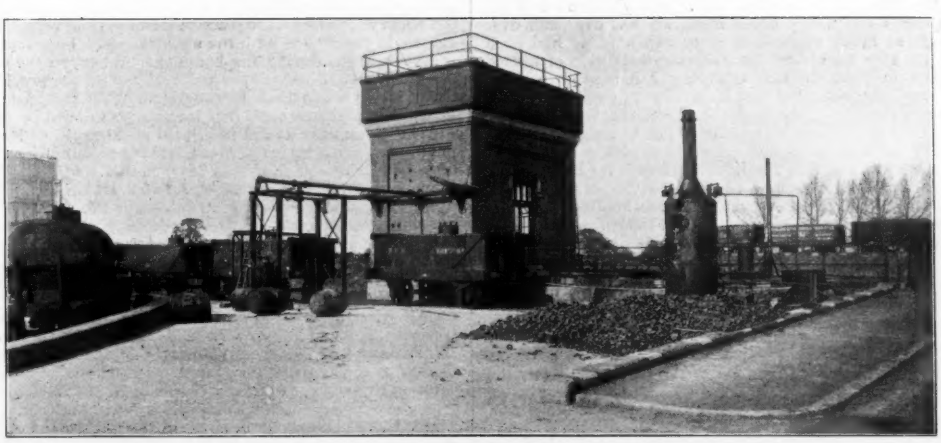
Moss and Sons	Loughborough	Gasholder tanks.
do.	do.	Sulphate works buildings.
Bentley and Lock	Leicester	Pipe subway under railway.
Eastwood, G. H.	Kettering	Timber work for acid plant.
Dorse, H.	Cradley Heath	Forming roads, levelling site, and constructing drains and relief gasholder tank, &c.
Kelley and Sons	Coventry	Buildings, comprising entrance office and canteen for workmen, valve and governor house, weigh offices, canal dock.
Lowe and Sons	Burton	Buildings for carburetted water-gas plant, retort-house, and coal-store and railway docks.
Kettering Co-operative Builders, Ltd.		Meter-houses.
Johnson and Sons	Leicester	Workshops and water-tower.
Vale and Sons	Stourport	Power-house, boiler-house, and chimney shaft.
Orr Brothers	Coventry	Buildings comprising works offices, laboratory, and coal-testing plant.
Dorse, H.	Cradley Heath	Underground liquor tank.
Bentley and Lock	Leicester	do. do.
Vale and Sons	Stourport	do. do.
Mobberley and Bayley	Stourbridge	Fire-clay goods for retorts.
Harrison, George K.	do.	do. do.
Goddard, Massey, and Warner	Nottingham	Sulphate plant.
Horseley Company	Tipton	Gasholder tanks ironwork.
Danks and Co.	Oldbury	Steam boilers.
Gilbert Thompson, Ltd.	Birmingham	Sulphate buildings ironwork.
C. & W. Walker, Ltd.	Donnington	Gasholders.
R. & J. Dempster, Ltd.	Newton Heath	Relief gasholders, carburetted water gas.
Horseley Company	Tipton	Purifiers.
Whessoe Company	Darlington	do.
Cross and Cross	Leicester	Carburetted water-gas buildings ironwork.
Russell and Sons	do.	Roofs for oxide sheds.
Keay, E. C. & J.	Birmingham	Constructional steel work, retort-house, coal-stores, &c., coke-shed, and elevated tramway.
Clapham Brothers	Keighley	Retort-mouthpieces, fittings, and ascension-pipes, &c. Condensers and Livesey washer.
Newton, Chambers, and Co.	Sheffield	Steel foul mains and cast-iron tank.
Aldridge and Ranken	London	Stoking machinery.
Musker, C. & S.	Liverpool	Hydraulic plant.
Edgar Allen and Co.	Sheffield	Coal conveying plant.
W. C. Holmes & Co.	Huddersfield	Washer-scrubber (rotary).

The Opening Ceremony.

At the opening ceremony, which was performed by the Mayor (Alderman W. Lee), there was a large attendance of members of the Corporation and leading citizens; the company including the Chairman of the Gas Committee (Mr. W. H. Batchelor), the Gas Engineer and General Manager (Mr. Fletcher W. Stevenson), the City Engineer (Mr. J. E. Swindlehurst), and the Town Clerk (Mr. G. Sutton). There were also present Mr. G. Hampton Barber, the Secretary of the Gas Department of the Birmingham Corporation, Mr. Charles Meiklejohn, of Rugby, and Mr. Thomas Berridge, J.P., of Leamington.

The company having assembled,

Mr. Batchelor, on behalf of the Gas Committee, asked the Mayor



Pump House over the Tar and Liquor Tanks—Loading-up Tar.

to declare the works open. He said he thought his Worship had never been asked, during his three years of office, to perform so important a ceremony—certainly not one costing the ratepayers so much money. He recalled the fact that the Corporation purchased the gas undertaking from the Coventry Gas Company in 1884, paying £170,000 for it. At that time the output of gas was 185 million cubic feet; but the present output was 800 millions. It would therefore be seen how greatly the undertaking had grown since 1884. The growth had been steady from the commencement. The old gas-works were not on a very suitable site, which was only about 4½ acres in extent; and they were cramped. Therefore it was not long before it became evident that a move would have to be made. The City Council gave sanction for an Act of Parliament to be applied for in November, 1897; and it was obtained in August of the following year. Many difficulties were encountered in getting a new site suitable for gas making. It was necessary that it should be close to the railway, and, if possible, at the side of the canal. The present site had these advantages; and it cost £5648. It was, however, anything but an ideal one, for it was very irregular in level and of peculiar shape. Some time elapsed after the purchase before any move was made towards putting works upon it. Meanwhile considerable congestion took place at the old works, owing to the rapid development of the city and the growth of its industries; and after Mr. Stevenson had succeeded Mr. George Winstanley as Engineer, he was asked to prepare a scheme. He lost no time in doing so; and the then Chairman of the Gas Committee (Mr. R. A. Rotherham) was able to lay before the Council complete and comprehensive details for the removal of the whole of the gas making for the city to the present works. The Council readily recognized the necessity, and promptly sanctioned the scheme. It was to cost £180,000; and the works were to produce, when completed, 4½ million cubic feet of gas per day. The estimate of cost had been exceeded by about £14,000; but there had been a corresponding increase in capacity of production of from 4½ to 5½ million cubic feet per day. They were thus getting an extra return for the additional outlay. The capacity of the works was much in excess of present requirements; but it was wise to have a fair margin left for reserve. The Gas Committee believed they had excellent and up-to-date works, at which gas would be produced as economically as at any works in the country. They had been designed by Mr. Fletcher Stevenson, who had put his whole energies into the scheme. There were in the new works numerous improvements as compared with the old ones. Great advances had taken place in the equipment of modern gas-works, and the methods of working had been very much improved; and these had been incorporated in the scheme whose completion they were asked to endorse. He desired to call attention to the facilities provided for the comfort and safety of the men employed.

The Mayor was loudly applauded on proceeding to declare the works open. He remarked that Coventry was one of the first cities to adopt gas as an illuminant. The new works were designed to manufacture and distribute, in the city and the neighbourhood for many miles round, gas for lighting, heating, or driving purposes, with as little sulphur as possible. There was no need for him to repeat any description of the works, but he might say they could be classed as containing one of the finest gas-making plants in the kingdom. No expense had been spared, and every advantage had been taken to secure the latest inventions which human ingenuity could devise. There was a freshness of conception and treatment in some of the details which could not fail to be noticed when the works were inspected. Much had been done to adopt labour-saving appliances, but not with a view to reducing the cost of production only. He was thinking of labour of the most exhausting character which ought to be done by a machine. As to the demand for gas, he was informed that there were some 400 gas-engines of various types depending more or less upon these works, in addition to the large supplies required for lighting and heating. Sometimes it had been impossible to meet the demand; and the new works became absolutely necessary. Originally the gas undertaking in Coventry belonged to a private Company; but the time came when it appeared to the representatives of the citizens that the supply of gas ought to be in the hands of the people. It was very interesting to recall with what hesitation and timidity they entered upon the business. There were only four or five members in the City Council now who were in it when the gas supply was taken over, twenty-five years ago. Long and serious debates took place, and a town's meeting was held before the matter was settled. One gentleman, a member of the Council, said he thought it would be a good thing for the gas supply to be in the hands of the Corporation. He was a shareholder, of course. (Laughter.) The reply was that £168,000 was a lot of money with which to saddle the ratepayers. This was from one of the old sort—one who was supremely anxious to keep the city debt within reasonable limits, and the rates also. But £168,000 was not much at the present day; they could manipulate it over and over again. He supposed much more than twice this amount had been expended upon the new works and the necessary extension of mains. The works taken over from the Gas Company had been greatly extended and practically rebuilt; but they became utterly inadequate for the requirements of the city. They were the goose that was to lay the golden eggs; but it had not been so prolific as some thought it would be. Still, £49,614 had been paid over out of the profits in relief of the rates, besides interest and sinking fund. They hoped for much larger results from the new works; and he trusted the Corporation would always remember that the ratepayers were the shareholders.

A vote of thanks having been accorded to the Mayor for performing the opening ceremony, an inspection was made of the new works.

Hospitality of the Mayor—An Interesting Presentation.

In the evening, the Mayor entertained a large number of guests at St. Mary's Hall, the ancient building in which the meetings of the City Council are held. A special incident of the proceedings was the presentation of a silver epergne to the Mayor by Mr. Batchelor, on behalf of the Gas Committee.

The Mayor proposed "Success to the new undertaking." In doing so, he said all must confess that they had been much impressed by what they had seen in the afternoon. He held to the belief that gas would never be superseded by the electric light; for if they had not believed it, they would not have gone to the expense of erecting new gas-works.

Mr. Batchelor, in responding, remarked that some people had criticized the gas undertaking, and had said the Gas Committee had gone too far and spent too much money. He did not think they had done so. Judging by the way in which the undertaking had grown, he did not see how anyone could come to any other conclusion than that they had done the right thing. There were rumours in the air that, owing to coalfields being discovered in the neighbourhood of Coventry, the city might grow more rapidly than it had done in the past. The policy of the Gas Committee had been to retain, as far as possible, the whole of the large consumers; and, owing to the reduction in the price of gas, they had succeeded in a great measure in doing this. Though they sold gas to the large consumer at a lower price than to the ordinary consumer, they still had a very good margin of profit on their production charges; and by retaining the large consumer they stood to gain more, because these charges would be less. The policy of the Committee in the future remained to be settled. In any reduction they made, he was convinced that the small consumer should be considered. He also strongly advocated reducing, when opportunity occurred, the dead-charges caused by the abandonment of the old works. A point for congratulation was that they had removed the works to Foleshill without asking for any financial support from the ratepayers. He did not care about prophesying, but he thought he might say there was every prospect of their making at least £10,000 additional profit next year.

At this point in the proceedings the presentation to the Mayor was made, and suitably acknowledged by his Worship.

Mr. Batchelor then proposed "The Health of the Gas Engineer." He said Mr. Stevenson rapidly gained the confidence of the Committee, and had maintained it. They got along with the work of the Committee very smoothly, due largely to the fact that everything was made clear to them when it was brought forward. Mr. Stevenson had the management and designing of the new works in his sole charge, and had no outside assistance whatever. If anything could compare with his ability as a gas engineer, it would be the courtesy he showed to everyone connected with the work. The responsibility of managing the old works and the construction of the new ones at the same time must have been very heavy; and they were glad Mr. Stevenson had survived the ordeal, and would now get some well-deserved rest from his labours.

Mr. R. A. Rotherham (who was Chairman of the Gas Committee when the scheme was introduced and adopted) spoke in response to loud calls. Dealing with the question of relief of the rates from the gas undertaking, he said he did not wholly believe in it. The Corporation held a monopoly, not only of gas making but of gas distribution in the city; and they must not forget that the profits they earned were being made out of the pockets of the gas consumers, who were paying off the sinking fund, and that when this disappeared the city would have as an asset the old and the new gas-works. They must remember, therefore, that the gas consumer was the first person to receive consideration at their hands. As to the Engineer, he (Mr. Rotherham) participated to the whole of his power in inducing the Gas Committee to secure Mr. Stevenson's services; and he hoped they would keep him. It was sometimes said that sums spent on the Gas Department were investments of the ratepayers; but the money spent was as nothing compared with keeping Mr. Stevenson as their Gas Engineer. They could not have a finer investment than a really good man. They had him, and he hoped they were going to keep him, as the success of the undertaking had been largely due to his ability, loyalty, and hard work.

Mr. Stevenson, in responding, referred to the capital expenditure upon the new works. He said he had heard it stated that the Gas Committee had spent £25,000 more than the £180,000 he estimated, and that the works they now had were no good. They had only to live a year or two to prove or disprove the latter part of the statement. The estimate he put before the Committee in 1902 was for works to produce 4½ million cubic feet of gas per day for a capital expenditure of £180,000. Before he became their Gas Engineer, there had been an expenditure of £10,000 on the siding which the London and North-Western Railway Company made to connect their line with the works. This had to be added to his estimate, which made a total of £190,000 for a production of 4½ million cubic feet per day. In developing the works, he was clearly impressed with the fact that a small extra expenditure would give them a greatly increased output; and the consequence was that, for the increased cost of £14,000, they had now works which would produce 5½ million cubic feet of gas daily—a million more than if the works had been carried out on the original estimate. The cheapness of raw materials at the time the contracts were accepted, and the boom which had taken place in the city, were very fortunate circumstances in connection with the undertaking. The increase in the consumption of gas during the boom had not only enabled them to pay their way but to reduce the price of gas on two occasions during the time the work had been in progress. With regard to future profits, he could confidently state that the sum mentioned by the Chairman of the Gas Committee as the additional profit expected next year was the minimum; and if trade improved, and the consumption of gas increased, he hoped to be able to show a balance that would surprise them. As to profits in relief of the rates, he said let the people who made the profit—that was the gas consumers—have the benefit of it. In Coventry, gas was so largely used for trade purposes, so many traders were dependent upon it, that it was suicidal to keep up the price. It should be supplied at the lowest figure. There were two things, now that the works were completed, which he would not be satisfied till he had effected. One was to reduce the capital of the concern for the business done to what it was when he came in 1902; the other was to bring down the price of gas to 2s. per 1000 cubic feet on an average.

Mr. Band (the Vice-Chairman of the Gas Committee) proposed "The Health of the Contractors;" and the toast was acknowledged by Mr. Thomas Clapham, of Messrs. Clapham Bros., Limited.

Mr. White proposed "The Visitors."

Mr. E. W. Drew, the Auditor of the gas accounts, responded, and congratulated the citizens upon the sound policy adopted by the Corporation in connection with the gas-works.

PRIVATE RAILWAY SIDINGS AND TRAFFIC.

THE proceedings recently reported in the "JOURNAL," in which the Corporation of Birmingham, who have constructed extensive private sidings at their Saltley, Nechells, Windsor Street, and Swan Village Gas-Works, applied to the Railway Commission for an order declaring them entitled to an allowance or rebate on charges made by the Midland, London and North-Western, and Great Western Railway Companies, on inward and outward traffic to the various works, have brought into unusual prominence, so far as our readers are concerned, the subject of private sidings and railways and the traffic upon them. Very opportunely, therefore, comes to hand a little book by Mr. J. H. Cockburn, a solicitor of Rotherham, in which he places before the public the law on the subject in brief and concise form, and in plain and simple terms.* He has endeavoured to collect and set out the principal enactments and decisions in a way which, while it may assist the members of the legal profession in a certain degree, the ordinary business man may read and understand.

Mr. Cockburn divides his work into three parts. In the first he deals with the making and maintenance of private railways and sidings, and begins by indicating the lands and thoroughfares over which they can be made. He then passes on to consider successively the subjects of light railways, making connections with statutory railways, and entering into contracts for the construction of private railways and sidings. Some remarks on nuisances, accidents, and criminal offences follow; and this portion of the book closes with a chapter on the discontinuance of siding connections. The author emphasizes the point that when once a private railway or siding has been connected with the main line of a railway company pursuant to statutory authority, the company have no power to disconnect it; and they can be made to pay exemplary damages if they block up the junction. An opening once made into a railway is a permanent right, and cannot be taken away because circumstances have altered. In dealing with private traders' sidings, Mr. Cockburn clearly defines what are the "reasonable facilities" which, under the Railway and Canal Traffic Act, 1854, every railway company are to afford for receiving, forwarding, and delivering traffic; and he follows up his remarks with two chapters on conveyance rates and special charges for sidings traffic. The other chapters in this part of the book are devoted to rates and charges, rebates, and undue preference. The third part contains chapters on private owners' waggons, agreements as to sidings and traffic, and the powers of the Railway and Canal Commissioners.

The foregoing is merely an epitome of the contents of Mr. Cockburn's book, the preparation of which must have occupied considerable time; for at the foot of each page references will be generally found to the various sets of law reports, and in many instances to the page of the report on which the statement in the text is founded. The text is preceded by tables of cases and statutes, and is followed by a useful index.

* "The Law of Private Railway Sidings and Private Traders' Traffic." By John Henry Cockburn, Solicitor. London: Stevens and Sons, Limited; 1909. [Price 7s. 6d. net.]

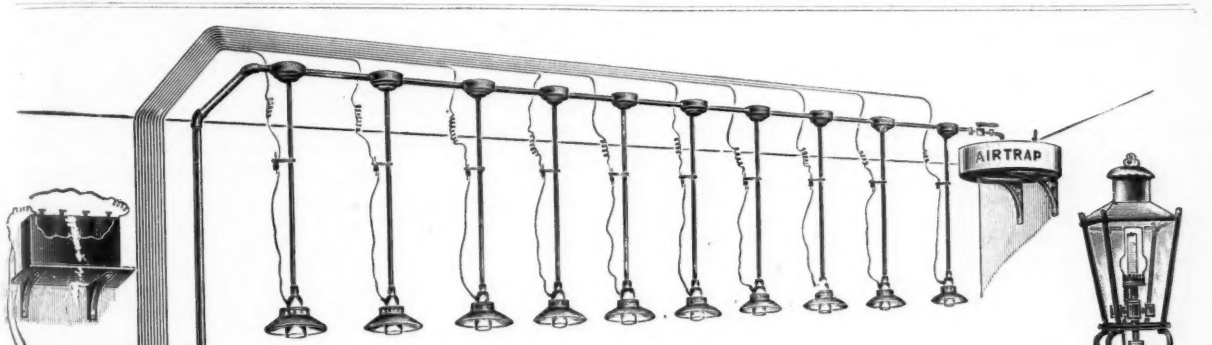


Fig 1.

Fig. 2.

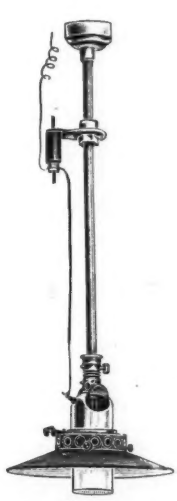
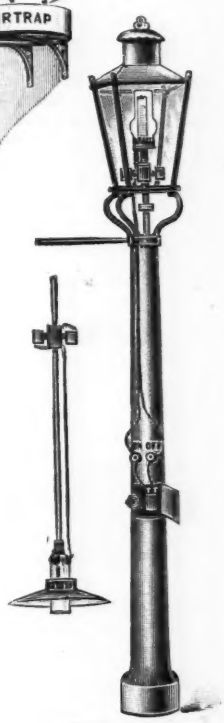


Fig. 3.



Figs. 4 and 5.

DISTANCE LIGHTING WITH SPARK IGNITION.

In view of the extended adoption of distance lighting in connection with both indoor and outdoor installations of incandescent burners, it is unnecessary to dwell upon its many advantages; and we refer to it now merely to direct attention to an addition which has been made to the systems already before the gas industry, in the shape of the spark ignition arrangement of the Herbert Tuchman Manufacturing Company. It is claimed for this system that it embodies a novel principle, consisting in the separation of the transformer from the trembler, which permits the use of bell wire or flex for the primary leads, and dispenses with insulation of the secondary leads, which are only of short length. The gas can either be controlled mechanically by a cock for 10 or 20 lights, or be operated from a distance by a mechanical pull device; and for installations where each light requires to have separate control, small magnets are used in place of cocks or taps, which permit the lights to be switched on and off by means of a two-way push-button.

The system consists of a battery, transformer, trembler, and spark leads. The 4 or 6 volt current generated by the battery is altered by means of the trembler to a current that can be changed to high tension in the transformer, which is placed near the burner, and which when connected to the spark leads on the burner produces a hot spark. The transformer consists of a core of laminated soft iron surrounded by a short coil of thick and a long one of very thin wire; and the over-all dimensions vary from ½ inch to 1 inch. The spark leads are stout sparking wires with steatite insulators. These leads are not affected by heat, and the transformer for inverted burners can be kept out of the heat zone, or can be enclosed in an iron or aluminium casing. The spark produced by the transformer is of the same strength as that used for firing the explosive mixture for internal combustion engines. For outdoor installations, where the wire is subject to atmospheric influences, lead-covered wire is used.

The preceding illustrations will give an idea of the application of the system. Fig. 1 shows a 10-light inverted or vertical burner installation for 100 feet run of piping, with one gas-cock controlling 10 lights, and the 10-way switch placed near the

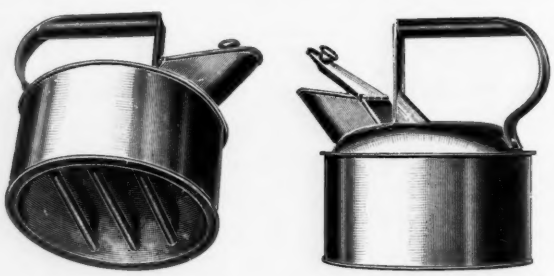
gas-cock. When the handle of the switch is turned, the burners light up instantaneously. Fig. 2 is the stout wire spark-lead and transformer for vertical burners. Fig. 3 is a 16-inch pendant with spark leads, transformer, and inverted burner. Figs. 4 and 5 show an inverted and a vertical burner, with electric tap and spark leads, with which two-way push-buttons switch the light on and off.

The manufacturers claim for their system that it is specially adapted for the lighting of churches, school-rooms, mills, and factories; and they submit that for places where the presence of naked lights is not desirable—in retort-houses, for example—it offers great advantages by obviating fire risks. It can be applied to the lighting of railway carriages, sidings, and signal-lamps; and in the latter case it would allow each light to be under the control of the signalman, thereby obviating the climbing of a ladder by an attendant to turn on the bye-pass. The system is in use for the ignition of mantle burners on trains where the conditions of service are most severe; and it is stated to be giving every satisfaction. The following are the advantages claimed for it: Instantaneous lighting of large units from one central point; absolute reliability of the spark, which cannot miss-fire; abolition of bye-passes, thereby saving consumption; naked lights or matches dispensed with, thereby reducing risks of fire; extended life of mantles; and the services of a lamplighter rendered unnecessary.

With regard to cost, it is stated that the outlay required for renewals for an installation of (say) 50 lights will not exceed 20s. per annum, including new batteries, which have an average life of fifteen to eighteen months. Portable battery sets can be supplied which will ignite 500 lights for an entire year. The wiring can be done by any bell-fitter; and the cost of the wire is a very small item.

GAS-STOVE KETTLE.

Specially constructed utensils for employment with gas-stoves and boiling-rings are not so plentiful on the market as the extensive use of domestic appliances in which gas is the heating agent might have led one to expect. The reason for this is that the cheap utensils that have been in use with the old open coal fire are equally applicable—if not always of the most economical form—to the gas-stove. But the question of the production of special vessels for boiling and cooking, in conjunction with gas stoves and rings, has not been altogether neglected. Gas heating for cooking and boiling purposes is economical already; but there is no reason at all why, by simple construction of the auxiliaries, it should not be more economical still. Economy, combined with efficiency, is the mainstay of the gas industry. In Waite's patent quick boiling tubular kettles (made by Messrs. Crompton and Fawkes, Ltd.), we have a successful attempt at getting a greater



amount of work out of a given consumption of gas in the boiling of water. A sample is before us, left for inspection by one of the agents, Mr. H. R. Hammond, of 5, Matham Grove, East Dulwich. The time saved by the use of this kettle in boiling water over a gas-ring represents a saving of half the cost of the gas used in boiling an ordinary kettle of similar capacity. The kettle is strongly made from the best quality tinned sheet metal. But the bottom of the kettle is where the interest lies. It is recessed in such a manner that inside the kettle a fairly deep channel is formed, in open connection with which are three copper tubes, tinned inside. On to these tubes and the recessed bottom the gas-flame directly impinges; and, immediately, there is set up a circulation of the water inside the kettle, much on the same principle as the geyser. The kettles are made from two up to ten pints, at quite reasonable prices. The two-pint kettle, we are informed, only takes between two and three minutes to boil with gas of about the commonly supplied calorific power. Another point is that the rapid flow of the water through the tubes prevents furring; one kettle that has been in continuous use in a particularly hard-water district for over eight months shows tubes and bottom almost as clean as when new. The inlet and outlet of the kettle is the broad spout, with hinged cover. At a small extra expense, the bottoms (as well as the tubes) are made of copper, tinned inside. Of course the kettle must not be allowed to stand over a flame without water in it, as the tubes would no doubt quickly become injured; but their replacement is only a matter of a few pence. The same principles of construction are applied to milk or porridge saucepans, egg saucepans, urns, and bronchitis kettles.

EXTENSION OF THE LANDY (PARIS) GAS-WORKS.

Some time ago, the Paris Gas Company decided on extending their works at Le Landy; and, in accordance with requirements, they made application to the Prefect of the Seine for the necessary authority. The Hygienic Council of the Seine had also to be consulted in the matter, so as to ensure that the proposed works would be in no way injurious to the public health. This body referred the Company's proposals to M. Jungfleisch, who reported favourably upon them to the Prefect; and, as there was but slight opposition, which was easily satisfied, they were approved by the Council. From his report, which is given in the current number of the "Journal des Usines à Gaz," we take the following particulars in regard to the extensions.

The works have been in existence since 1882, and are favourably situated for their purpose. They occupy a vast area on the plain of St. Denis, so that the extensions will be made upon the old site. Recent purchases of land have, however, considerably increased the area at the disposal of the Company. The productive capacity of the works is to be increased fourfold. The daily output has hitherto been rather more than 6 million cubic feet; but it is to be raised to 24⅜ millions. It is proposed to erect three retort-houses, each containing six settings on the same lines as those in the old house. They will all be on the Siemens regenerative system—each setting containing nine through retorts 20 feet long; and the houses will be equipped with mechanical stoking and coke quenching and conveying machinery. In connection with each house the usual condensing, washing, exhausting, and purifying plant will be installed. The coke-breaker will be constructed so as to be able to screen all the coke produced. The coal-conveying and stoking machinery will be actuated from the central electricity station, of about 3200 kilowatts capacity, already in operation. The works will be amply supplied with river and well water; and the comfort and health of the men will be assured as far as possible by lavatories, clothes closets, and mess-rooms.

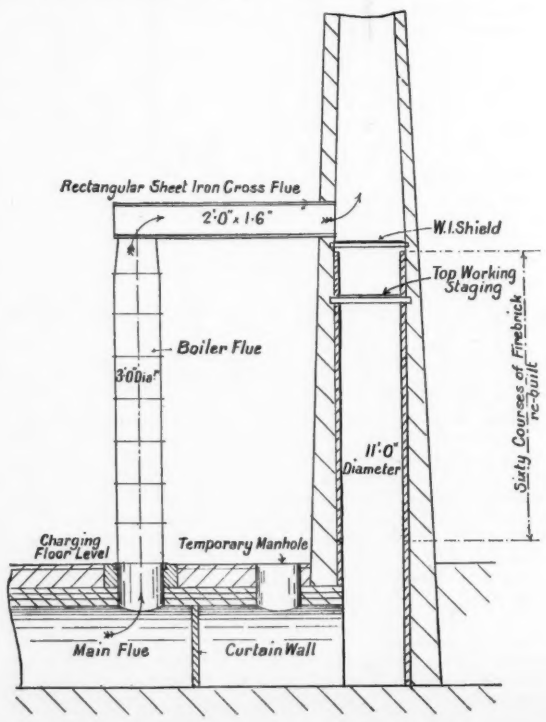
The present storage capacity of these works is close upon 6 million cubic feet; but three additional holders, each of about 5¼ millions capacity, are to be provided. Two are in hand, and are to be ready by October; and the third will be finished next year. The new holders are three-lift; their full height being 131 feet. They will be of nearly 33 feet greater diameter in the lowest lift than the existing large holder.

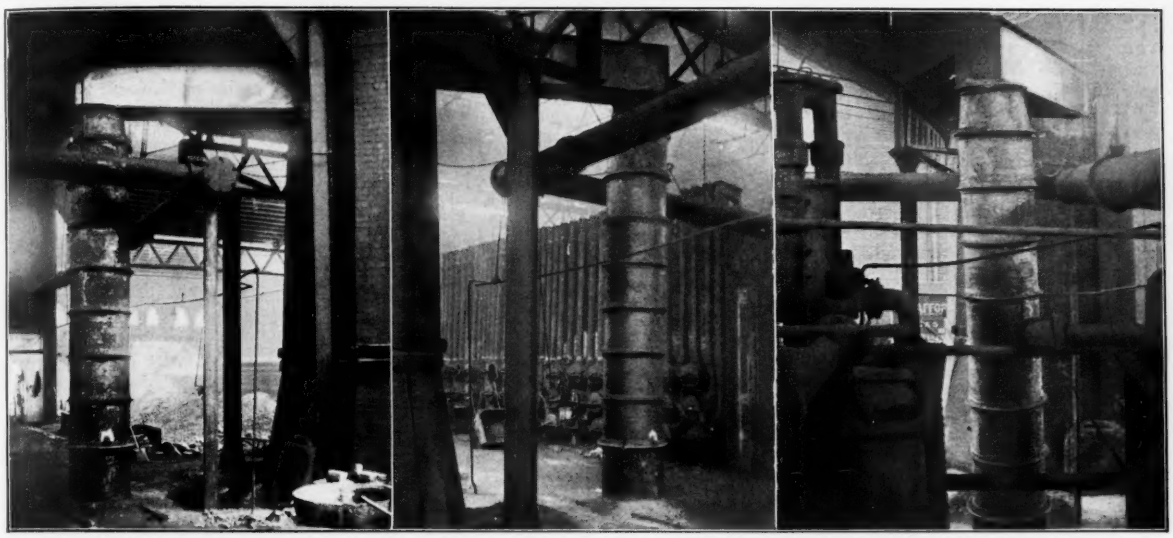
The works above described will be followed eventually by others which will bring up the total productive capacity of the station to 35¼ million cubic feet per day.

REPAIRING A GAS-WORKS CHIMNEY.

By Hubert Pooley, of Stafford.

It has occurred to me that some photographs and an explanatory sketch of a difficulty which we have just overcome may be of interest to readers of the "Journal."





During the early part of the winter, the fire-brick lining of our gas-works chimney fell in part, completely blocking the main flue on two occasions. The main flue was opened, and the accumulated bricks got out each time.

On Wednesday, the 2nd inst., we commenced the repair of the chimney; bye-passing the lower part in the way indicated on the sketch. The photographs show the material used, which consisted of an old flue from a Cornish boiler and steel sheets which will ultimately be made into barrows. The false bottom in the interior of the chimney was made of old light rolled joists, with a flooring of similar steel sheets. Sixty courses of brickwork had to be put in.

The work was commenced on the Wednesday, and completed on the following Sunday morning. The only difficulty we had was that, since the bye-pass was so restricted in area, our heats dropped, and our make per ton fell.

DESCRIPTION OF THE WEARDALE AND CONSETT WATER-WORKS.

By Robert Askwith, M.Inst.C.E., President.

[**Prepared for the Annual Meeting of the Association of Water Engineers.**]

The district within the limits of supply of the Weardale and Consett Water Company has an area of 422 square miles, and is situated in the north centre of the County of Durham. This area is under the jurisdiction of two County Councils, a small portion (about 20 square miles in extent) being in Northumberland, 7 Rural District Councils, 14 Urban Councils, and the Corporation of the City of Durham. The registered office of the Company is at Darlington, which town is outside the limits of supply. The head office of the Engineer is at Bishop Auckland, which town, with an area of about 1½ square miles, is within the limits of the district of supply, but is excluded therefrom by Act of Parliament, and is supplied with water pumped from the gravel beds of the River Wear, which flows on the outskirts of the town. There is a branch office at Consett, used by a District Secretary and Assistant Engineer; and there are rate-collecting offices at Bishop Auckland, Consett, Durham, Chester-le-Street, Crook, Spennymoor, and Annfield Plain, which also act as centres for inspectors and plumbers.

The population supplied with water is estimated at 360,000—largely engaged in the coal-mining industry. The large ironworks of the Consett Iron Company, Limited, are in the Company's district, and consume a great quantity of water for manufacturing and domestic purposes. At one time a large iron-works at Spennymoor, known as the Tudhoe Ironworks, and other large works at Tow Law, Witton Park, and Thrislington were supplied with water by the Company; but, with the exception of the blast-furnaces at Tudhoe, Spennymoor, which formed only part of the Tudhoe works, these have all been removed to the seaboard. The City of Durham is supplied by the Company—a residential place and fitted with water-closets throughout.

The supply of water is obtained from four impounding reservoirs situated on the high hills in the western part of the limits of supply, as follows:—

—	Top Water. Feet above Ordnance Datum.	Date when Brought into Use.	Capacity in Millions of Gallons.
Waskerley reservoir . . .	1172	1871	450
Hisehope ,, . . .	1128	1905	106
Smiddy Shaw ,, . . .	1120	1876	305
Tunstall ,, . . .	720	1879	520

A supplementary supply of water is obtained in seasons of drought from a disused lead mine outside the limits of supply.

There are 22 service reservoirs or tanks, whose capacities vary from 3 millions to 175,000 gallons. The necessity for these will be understood when it is stated that a part of the highest town supplied—viz., Tow Law—is 1033 feet above sea-level; while a portion of the lowest town—Chester-le-Street—is only 40 feet above sea-level. The length of supply and distributing mains is 580 miles. The number of houses supplied is 68,000. The number of meter supplies is 1680.

There are many points of interest to the engineer in these works; but the author proposes to describe only the works of the two large reservoirs at Waskerley and Tunstall which are to be visited by members of the Association.

Waskerley Reservoir.

This, the erection of which was commenced in 1867, is formed by an earthen embankment with a centre puddle wall, 600 yards in length; the top-bank level being 1178 feet above Ordnance Datum. It is situated on a moorland in the millstone grit formation; the puddle trench being excavated in shales and greybeds, which, fortunately, were sufficiently free from crevices as to render the use of concrete unnecessary. The trench was filled with puddle made from local clay, and proved to be perfectly water-tight.

The waste-weir is 100 feet in width; the masonry being of local millstone grit. The bye-wash was excavated in sandstone, and it was thought unnecessary to protect this. But as, in course of time, this broke away and a deep ravine was formed by the flood water in the lower half, this was lined with concrete a few years ago, and ultimately the upper part will require lining also.

The tunnel and shaft (as was customary in those days) are in the centre of the embankment; and only one valve controls the discharge of water. The shaft, where hidden in the embankment, is built of brick set in lias lime. This was thrown out of the vertical and towards the reservoir to the extent of 3 feet in a vertical height of 90 feet by the uneven pressure of the earthwork of the embankment, and cracks appeared both horizontally and laterally in the lowest 30 feet of brickwork. When the valve was built in, a centre core of brickwork in cement was built in the shaft from the bottom to a point above the cracks. This movement caused great anxiety at the time; but, fortunately, it ceased in twelve months' time, and there has been no cause for anxiety since. The construction of the reservoir was commenced by contractors, who were unable to complete the work; and the latter half was carried out by administration.

The water passes from the reservoir through the tunnel

into a compensation-water gauge-basin, which, however, is no longer used for gauging purposes, owing to the Company being relieved from the obligation to give compensation water since the completion of the Tunstall Reservoir, which is at a lower altitude in the same valley.

The water is treated by an admixture of finely-ground burnt lime to prevent plumbo-solvency. Crushed carboniferous limestone was at one time mixed with the sand in the filter-beds; but, although this had the desired effect on the water, it was found that, after the lime contained in the stone had been dissolved by the water, there remained an insoluble residue which partly choked the beds and seriously retarded the process of filtration. The present simple arrangement, by which water is passed under pressure into the bottom of a tub, which has been charged with lime, and is carried through an overflow into a settling box and then forward into the gauge basin, answers its purpose thoroughly, as is shown by tests made by Sir Thos. Oliver, M.D., of Newcastle.

Quantity of Lead Expressed in Milligrams in each Half-Litre of Water.

	Before Treatment.	After Treatment.
1st day	0·9	0·1
2nd ,,	1·2	0·15
3rd ,,	1·8	0·20
4th ,,	2·0	0·25
5th ,,	2·1	0·30
6th ,,	not taken	0·30
7th ,,	2·2	0·45
8th ,,	2·5	0·50
9th ,,	2·6	0·60
10th ,,	2·6	0·65

The cost of this treatment of 1,660,000 gallons of water per day is less than £50 per year.

The water passes from the gauge basin into five filter-beds, which, owing to their great altitude, are covered by a timbered and slated roof. This gives the advantages that sand-washing can be carried on in the severest weather, each bed having a sand-washer in the centre; and the exclusion of light prevents the growth of algae during the summer months. Four out of the five beds are capable of efficiently filtering 1,660,000 gallons of water per day.

For several years water has been pumped from this reservoir into the Smiddy Shaw Reservoir, over the intervening hill 155 feet in height, by means of a steam pump; but two years ago the steam-pump was replaced by a suction-gas engine and three-throw pump capable of pumping a million gallons in 22 hours—the engine being of 105 (maximum) B.H.P. The cost of pumping 113,554,680 gallons against a total head of 170 feet during the year 1908 was £212 17s., which works out at 0·45d. per 1000 gallons pumped, or 0·26d. per 1000 gallons lifted 100 feet.

Tunstall Reservoir.

This reservoir is formed by an earthen embankment having a centre puddle wall 340 yards in length, and was commenced in 1873. It is on the same stream as the Waskerley Reservoir, but four miles lower down the valley. The top-bank level is 726 feet above Ordnance Datum, or 452 feet lower than that of the Waskerley Reservoir. It is built in the mountain (or carboniferous) limestone formation, in which some of the beds are very open, but are intersected by thick beds of shale, which prevent water going downwards, one of which formed an excellent water-tight foundation for the puddle wall. The stratification can now be easily seen and examined in the escarpment by the side of the bye-wash. The open beds caused great difficulty in making the reservoir water-tight, as the water can readily pass into the hillside for nearly its whole length.

When the reservoir was built, the puddle trench was terminated in the hillside near the bye-wash, and the joints in the open beds, which at that point were found to be filled with clay and appeared water-tight, were carefully cleaned out and filled with fine cement concrete. When, however, the reservoir was only partly filled, it was found that water was passing through these rocks in large quantities, and it became necessary to tunnel under the hill and cut a further trench 90 yards in length by 90 feet in depth, and 6 feet in width, and to fill this with cement concrete. It was impossible to remove in bulk that part of the rock against which the end of the puddle wall rested, and a wedge-shaped piece of rock was left standing to support the puddle until the extended trench had been excavated to its full depth. The rock was then tunnelled at the lowest level until the puddle was reached (care being taken to expose a very small quantity of the puddle at one time) and the space was filled with brickwork in cement. A tunnel was again driven at a higher level and similarly treated; and this was repeated till the whole of the wedge of rock was removed and replaced by brickwork.

When this and the concrete wall were completed, it was found that the water was passing near the base of the brickwork which supported the puddle; and holes were bored from the surface on the inside of the puddle wall at a distance of 10 feet from it, and cement grout poured into them. The percolation of water was in this way completely stopped in 1879, when the reservoir was brought into use.

The building of the concrete wall did not completely stop the flow of water through the limestone beds; but the quantity so passing was reduced to less than a million-and-a-half gallons per day when the reservoir is full. The whole of this is caught by means of drifts cut in the hillside at a distance of 22 yards from the wall, and taken into the hill on two levels beyond the end of the wall. The water, being of excellent quality, is turned into the filter-beds.

The overflow weir is 120 feet wide. The tunnel, which is 7 feet in diameter, and the shaft are built in the hillside; and there are two valves for letting out the water) placed one behind the other, the shaft being divided into two compartments. The water passes from the reservoir through the tunnel into a gauge basin, where compensation water is run into the stream; but a small quantity is drawn through a grating in the invert of the tunnel into the filter-beds to supplement the water obtained from the hillside.

The four filter-beds are open, and were built seven years ago on a surface that had been formed by deposit of earth about 23 years previously. The floors are of cement concrete, 18 inches thick, upon which the side walls are built. It will be noticed that the beds have gone slightly out of level without any visible fracture. Three of the filter-beds are capable of filtering 2 million gallons of water per day. The water passes from the filters into a covered pure-water tank, and thence, through a "Venturi" meter, into a 24-inch pipe, 10 miles in length, which conveys it into a service reservoir at Beechburn, having a capacity of 3 million gallons.

The whole of the work in connection with the erection of this reservoir and the filter beds was carried out by administration.

Messrs. T. & C. Hawksley, of Westminster, are the Consulting Engineers to the Company; and except the filter-beds at Tunstall, the works described were designed by them.

Tests of a Small Gas-Engine and Producer Plant.

In the course of a lecture delivered before the Manchester Section of the Institution of Electrical Engineers by Mr. A. H. Gibson, particulars were given of a series of experiments which had recently been carried out on a suction-gas producer coupled to a gas-engine in the Engineering Laboratories of the Manchester University. The plant was capable of developing 24 B.H.P., and was run at approximately full load over the whole series of experiments. The object of these was to determine the efficiency of the producer and engine under different conditions of working. The fuel used throughout was gas coke, containing 81·75 per cent. of carbon and 1·19 per cent. of hydrogen, and having a net calorific value of 12,635 B.Th.U. per pound dry. The general conclusions to which the experiments led are as follows: The composition and calorific value of the gas varies greatly with the quantity of water vapour supplied to the vaporizer, as does the thermal efficiency of the producer; the latter attaining its maximum value of 78·6 per cent. when the gas produced has its highest calorific value—viz., 127·1 B.Th.U. per cubic foot at 32° Fahr. under a pressure of 29·921 inches of mercury. The efficiency of the engine, however, falls off as the gas becomes richer; the reduction of thermal efficiency being accompanied by a decrease in the percentage of heat rejected to the jackets, and in an increase in the percentage rejected in the exhaust gases. The engine has a maximum thermal efficiency of 26·9 per cent. and a minimum efficiency of 22·8 per cent., measured on the brake horse power. The over-all thermal efficiency of the plant has a maximum value of 18·16 per cent., measured on the brake horse power; this occurring with a slightly greater vapour supply than that (0·4 lb. per pound of dry fuel) giving the maximum producer efficiency. This value coincides very fairly with that obtained by Drs. Bone and Wheeler in a series of trials, already noticed in the "Journal," on a large pressure producer developing approximately 3000 H.P., and burning bituminous coal as fuel. Under conditions of maximum efficiency in the small producer, the consumption of dry fuel was 1·11 lbs. per brake horse power per hour.

Canadian Gas Association.—The annual meeting of this Association will be held next Friday and Saturday in Montreal; and according to a statement made by the Secretary (Mr. A. W. Moore, of Woodstock, Ontario), a programme has been arranged which will ensure a highly successful gathering.

PRODUCER GAS FOR OPERATING WATER PUMPING ENGINES.

By D. Hastings Irwin.

[A Paper read at the Annual Meeting of the Association of Water Engineers.]

Since a paper on the above subject was read at the Bolton meeting of the Association in July, 1903, considerable strides have been made; and it has occurred to the writer that reliable data taken from plants in operation could not fail to be of interest to members. At that time, anthracite was practically the only fuel capable of being used in producer gas plants; but owing to improved methods, almost any fuel can nowadays be utilized. Ordinary gas-works coke is perhaps the cheapest fuel, and the most readily obtained; but bituminous coal slack, sawdust and timber-yard refuse, peat, and even cotton seed and cotton cake, are equally suitable.

The consumption of fuel per brake-horse-power varies with the material used; and the writer lately came across records of the working expenses of a 300 H.P. gas-engine driving a cotton-mill, and using gas-coke in the producer, where the fuel consumption, taken over a year's working, and including all stand-by losses, only averaged 1½ lbs. per horse-power-hour, with fuel costing 11s. 6d. per ton delivered. The engine, it may be added, was working considerably below its full output; and the result is remarkable, seeing that it was not a trial run, but the actual average cost during a year's working under normal conditions.

At the Alford Water-Works, in Lincolnshire, there are two 8 H.P. engines working with producer-gas made from anthracite, each driving, by means of a belt, a set of three-throw deep-well pumps delivering 3000 gallons of water per hour 235 feet high. During a trial run of six hours, 84 lbs. of anthracite, costing 30s. per ton, were consumed when both engines and pumps were in operation, delivering 6000 gallons of water per hour. This works out at 2·33 lbs. of fuel (costing 0·38d.) per 1000 gallons lifted 235 feet.

At the Spilsby Water-Works, also in Lincolnshire, two similar engines and plants are used for lifting 3000 gallons per hour (each) 145 feet high. During a six hours' test of this plant, 75 lbs. of anthracite were consumed when the engines and pumps between them were delivering 6000 gallons of water the full height. This represents 12½ lbs of fuel consumed per hour, or 2·08 lbs. per 1000 gallons lifted. The fuel consumption (costing 30s. per ton) works out at 0·33d. per 1000 gallons pumped.

At the Tendring Hundred Water-Works, in Essex, where two 90 H.P. gas-engines and suction-gas plants working on anthracite are installed, the Consulting Engineer to the Company (Mr. B. W. Bryan, Assoc.M.Inst.C.E.) recently carried out a test with the following results:—

Twenty-Four Hours' Combined Duty Test of 90 H.P. Gas-Engine, Suction Plant, and Force Pumps.

Average explosions per minute	55·4
Brake-horse-power	76·5
Water-horse-power	62·0
Gallons pumped per hour	30,183·0
Total head, in feet	402·0
Consumption of anthracite in lbs. per B.H.P.	0·664
do. do. per water H.P.	0·814
Cost per brake-horse-power per hour	0·109d.
do. water H.P.	0·135d.

Analysis of Twenty-Four Hours' Test.

724,410 gallons raised 400 feet high; coal consumed, 1223 lbs. = 1000 gallons lifted 100 feet high for 0·07d.

The following figures are interesting as giving the comparative working costs of the gas-engines *versus* the steam-engines originally used for the same purpose:—

Gas-Engines.

—	August, 1907.	August, 1908.	September, 1908.
Pump revolutions	697,470	626,319	559,165
Average revolutions per minute	19·2	16·9	15·89
Water raised	18,831,690	16,910,013	15,097,455
Coal used	21 tons 3 cwts.	17 tons 2 cwts.	16 tons
Total pumping hours	612	649¾	587
Average pumping hours per day	19	20·93	19·50
Maximum pumping hours per day	22·75	23·5	22·25
Pumped over 20 hours on days	6	22	14
Coal, cost per ton	..	..	34s.
,, total cost	..	..	£27 4s.

Steam-Engines.

—	August, 1906.	September, 1906.	September, 1907.
Pump revolutions	1,959,014	1,692,603	1,587,761
Average revolutions per minute	43·88	39·18	37·64
Water raised	17,631,126	15,233,427	14,921,471
Coal used	128 tons 12 cwts.	94 tons 7 cwts.	96 tons
Total pumping hours	744	720	703
Average pumping hours per day	24	24	24
Maximum pumping hours per day	24	24	24
Pumped over 20 hours on days	31	30	30
Coal, cost per ton	..	..	18s.
,, total cost	..	..	£86 8s.

From this it will be seen that the saving in fuel alone (gas *versus* steam) during September, 1908, was £59 4s.

At the Woodmansterne pumping-station of the Sutton District Water Company, where 100 H.P. engines and suction plants are working, an eighteen-hours' continuous pumping test was made by the Consulting Engineer to the Company (Mr. W. Vaux Graham, M.Inst.C.E.); and the results will be of interest.

Combined Duty Test.

Low-Level Well-Pumps.

	Engine Revs. per Min.	Explo-sions per Min.	Pump Horse Power.	Pump Revs. per Min.
Average	128·8	42·5	56·17	14·7

Duty and Cost.

	18 Hours.	1 Hour.	1 Min.
Gallons	938,926	52,162·6	869·3
Pounds of coal	646·9	36	·6
Cost, pence	98·8	5·5	·0916

1000 gallons 100 feet = 0·0702d.

High-Level Force-Pumps.

	Engine Revs. per Min.	Explo-sions per Min.	Pump Horse Power.	Pump Revs. per Min.
Average	155·2	53·5	82·3	39·45

Duty and Cost.

	18 Hours.	1 Hour.	1 Min.
Gallons	915,943	50,886	848·1
Pounds of Coal	949·8	52·21	0·87
Cost, pence	145	8	0·133

1000 gallons 100 feet = 0·0628d.

Coal used per pump horse power per hour, 0·64 lbs.
Cost of coal used per pump horse power per hour, 0·097d.
Total lift, 400 feet.
Average cost of pumping 1000 gallons lifted 100 feet = 0·066d.

On Nov. 6, 1906, the Engineer of the Rickmansworth and Uxbridge Valley Water Company (Mr. J. D. K. Restler, Assoc.M.Inst.C.E.) conducted a twelve-hours' test of a 100 H.P. gas-engine and producer plant driving the pumps at Rickmansworth, with the following results: The generator was filled up at 9.15 a.m., and left full at 9.15 p.m. After the twelve hours' test, the fire in the generator was cleared and the hopper refilled, and the plant left ready for running. To refill the generator required 191 lbs. of anthracite. The size of the coal used was 1¼ in. by ¾ in. best Welsh anthracite. The total coal used during actual running was 715 lbs. The duration of the brake test was twelve hours.

Averages.

Revolutions per minute	160
Explosions per minute	69·12
Indicated horse power	105·28
Brake-horse-power	92·53

Anthracite coal used in actual test, for twelve hours' run, per I.H.P. 0·56 lbs.
,, ,, ,, ,, ,, ,, ,, ,, ,, B.H.P. 0·64 ,,

The tests above quoted have all been made by independent engineers of high standing, and are therefore free from all bias on the part of the manufacturers of the plant. They show remarkably economical results.

The working expenses of a gas-engine and producer plant at the New Arrol-Johnston Car Company's works, although this was used for power generating, and not for pumping, will be of interest to the members, as they prove the great economy of suction-gas plant as compared with steam plant. The figures given for capital expenditure include all plant, foundations, and alterations to adapt existing buildings, but do not include mains from the power-house to the works. The running costs are derived from the power-house records up to the end of June, 1906; the readings of all necessary particulars having been taken every 15 minutes.

Capital Expenditure.

	£	s.	d.
40 B.H.P. engine, producer, piping, gas-bag, spares, and producer covering	396	10	0
140 B.H.P. engine, producer, piping, and covering	1068	0	0
Belts, 8-inch and 18-inch laminated	54	0	0
Two-panel switchboard, watt meter, and main switch	107	0	0
Cast-iron tank	135	0	0
D. C. generators, 30 k.w. and 94 k.w.	278	0	0
Air compressor, receiver, and starting gears	46	10	0
Foundations and floors	75	0	0
Inside cables, gratings, rails, furnishings, and erection	50	0	0
Alterations to buildings, producer-house roof, and scaffolding to producers	105	0	0
Total	£2315	0	0

The smaller plant ran 54 hours weekly, the larger 112 hours. Each was cleaned once in twelve hours; the coal riddled out and picked being returned to hopper.

INTEREST AND DEPRECIATION.

	£ s. d.
Interest on capital, 5 per cent on £2315	116 0 0
Depreciation on engines, piping, and tanks, 5 per cent. on £1355 10s.	67 16 0
On producers and coverings, 7½ per cent. on £290 10s.	21 16 0
On generators and switchboard, &c., 5 per cent. on £410	20 10 0
On belts, foundations, gratings, &c., 10 per cent. on £154	15 8 0
Annual total	£241 10 0

Average weekly output, 9500 k.w. hours.
Volts, 230.
Capacity: Large set, 425 amp.; small, 105 amp.
Average output: Large set, 330 amp.; small, 70 amp.
Load factor, 77 per cent.

Average coal per week (anthracite doubles, at 15s. 6d.)	14,500 lbs.
Average coal per k.w. hour	1·53

STAND-BY LOSSES.

Two producers at week end	450 lbs.
Small producer, five nights	250 ,,
	700 lbs.
Average coal per week for power (14,500−700)	13,800 lbs.
Average coal per k.w. hour for power	1·45 ,,

LABOUR.

One man at 24s., one at 22s. (night shift), and relief at 4s. per week £2 10s. 0d.

WATER (costing 4d. per 1000 gallons).

In large scrubber and boiler, per hour	260 gallons.
In small scrubber and boiler, per hour	159 ,,
In exhaust valve	112 ,,
Total per week	40,200 gallons.
Per k.w. hour	4·24 ,,

OIL (Average cost, 1s. 8d. per gallon).

Total for all purposes per week	3·6 gallons.
Per k.w. hour	·000038 ,,

COAL GAS.

In starting engine and burner of 140 H.P. engine per week	1000 cubic feet.
Per k.w. hour	0·105 ,,

Repairs and renewals (say) £15 per annum.

COSTS per k.w. hour, assuming a working year of 49 weeks.

Anthracite	$\frac{1{\cdot}53 \times 15s.\ 6d. \times 12}{2240}$	0·1270
Coal gas	$\frac{1000 \times 2 \times 12}{1000 \times 9500}$	0·0026
Wages	$\frac{50s. \times 12}{9500}$	0·0630
Water	$\frac{40{,}200 \times 4d.}{9500}$	0·0170
Lubricating oil	$\frac{3{\cdot}6 \times \frac{1}{8} \times 12}{9500}$	0·0076
Depreciation and interest	$\frac{241{\cdot}10 \times 240d.}{49 \times 9500}$	0·1250
Repairs and renewals	$\frac{15 \times 240}{49 \times 9500}$	0·0077
		0·3499

Total cost of 1 k.w. hour at switchboard, 0·35d.

In January, 1909, Mr. Percy Griffith, M.Inst.C.E., conducted a series of tests with two gas-engines and producer plants at the new Skegness Water-Works at Welton, Lincolnshire. The trial extended over twelve hours; anthracite coal, costing 37s. 10d. a ton delivered, being used in the producers. The water was lifted 210 feet high, including the friction of the rising main; and it was found that the cost (fuel only) of raising water into the reservoir was 0·25d. per 1000 gallons.

Since the previous paper on this subject was read, great improvements have taken place, not only in engines, but also in producer plants. Much larger engines are now on the market; and the question can be looked at by water-works engineers from quite a different standpoint.

Mr. Dowson, M.Inst.C.E., recently pointed out, in a letter to the "Electrical Times," that the working costs of gas power are considerably less than those of steam power per brake-horse-power. But for station work there are other costs to consider; and it is not safe to assume that in all cases when gas power is used the total cost will be only one-third the cost of steam power. The chief saving is in fuel; the cost of repairs is also less; wages, oil, and sundries are about the same; interest on capital outlay and depreciation should also be considered in each case. All makers of gas-engines guarantee that the consumption of fuel shall not exceed 1 lb. of small anthracite, or about 1¼ lbs. of coke, per brake-horse-power-hour. The stand-by loss of a gas-producer is much smaller than that of a steam-boiler of the same power; and the importance of this is often overlooked. After much careful investigation, it has been found that for plants of from 200 to 500 brake-horse-power, the stand-by loss of the boiler plant was 15 to 20 per cent. of the total fuel consumed in 24 hours; whereas with a gas-producer the loss was only 2 to 4 per cent. Speaking with some knowledge of units up to 300 and 375 horse power, one may state that with good engines and gas plants the working is reliable and trustworthy, and the saving in cost of fuel is about 50 per cent., where the price of the fuel for gas is not more than 25 per cent. higher than that of steam coal. It will, however, be clearly understood that the losses in connection with the pumps will be the same whether gas or steam is used for power. The saving in cost of fuel may, however, in some cases be proportionately very large, and therefore of great value in the case of small stations. But in others it may not be so; and each case must therefore be considered on its merits.

The tabular statement appended is the report of a test of plant that was recently put in for the Mersey Docks and Harbour Board, for emptying the Queen's Dock. It comprises two 510 B.H.P. gas engines, each directly connected to a 48-inch centrifugal pump, fitted with a 7 ft. 10 in. disc. The engines are of the two-cylinder horizontal *vis-a-vis* type, and are driven by coal gas taken from the Corporation mains. The engines are not working to their full capacity, or better would have been obtained. Coal gas is used in this case, owing to the fact that the dock may have to be emptied at a moment's notice, and the saving of the time necessary to get gas-producers into working condition is an important consideration.

A similar plant was at the same time installed for emptying the Brocklebank Dock.

Among the points which will most naturally occur to the water-works engineer in connection with gas-driven pumping stations generally is the small space occupied, the small amount of attention required, and the absence of smoke and tall chimneys. The two latter considerations are very important where a pumping station has to be erected in a residential district.

Results of Test of Gas-Engines Operating Centrifugal Pumps at Queen's Dock (Mersey Docks and Harbour Board).

Time.	Approx. Water Levels in Dry Dock.	Fall of Water in Dry Dock.	Levels in Wet Dock.	Static Head.	Friction through Pipes.	Total Head. Feet.	Galls. per Min. each Pump. Average.	W.H.P. Total for both Pumps Sea Water. 10·27 lbs.	B.H.P. Gas Engine. 85 per Cent.	Pump Efficiency W.H.P. / B.H.P.	Revs. per Min. Average	Gas Consumption. Cubic Feet.	Gas per B H.P. Hour.	Gas per W.H.P. Hour.	U. Velocity Through.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.						Per Cent.					
12.20	32 0	—	32 0	—	—	—	—	—	—	—	—	—	—	—	—
12.35	—	5 3	32 1	2 7½	3·1	5·7	70,000	248	780	31·8	132	3,400	17·45	54·9	—
12.50	21 8	5 1	32 2	7 10	2 7	10·5	63,800	418	870	48·2	140	3,700	17·00	35·4	—
1.5	—	4 9	32 2	12 9½	2·3	15·1	58,800	552	910	60·7	138½	3,900	17·15	28·3	—
1.20	12 7¾	4 3¼	31 9	17 1	1·7	18·8	51,500	602	925	65·1	135½	3,800	16·45	25·3	—
1.35	—	3 9½	31 9	20 10½	1·2	22·1	43,100	594	915	64·8	131½	3,800	16·6	25·6	—
1.50	5 6	3 4½	31 10	24 5½	1·0	25·5	38,000	604	893	67·6	133½	3,800	17·00	25·2	—
2.5	—	2 10	31 10½	27 3½	0·7	28·3	31,400	554	923	60·0	133	3,800	16·45	27·5	—
2.20	+1	2 7	31 11	30 5	0·6	31·0	27,600	533	918	58·0	135½	4,000	17·4	30·0	—
2.35	−2 2	2 3	31 11½	33 0	0·4	33·4	23,400	486	920	52·9	135½	3,900	16·95	32·1	—
2 42	Crown of dock dry			—	—	—	—	—	—	—	—	—	—	—	—
2.47	South engine stopped			—	—	—	—	—	—	—	—	—	—	—	—
2.50	—	—	—	35 5	0·35	35·8	20,800	465	930	50·0	138	3,500	16·7	33·6	5·04
Aver.	—	—	—	—	—	—	—	506	902	56·0	—	—	16·8	30·0	—

Dock emptied in 2 hours 27 min. Contract time, 2 hours 33 min. 37,600 cubic feet of gas.

NEW METHOD IN WATER-GAS MANUFACTURE.

By Henry I. Lea, of Chicago.

[Extracts from a Paper read before the Illinois Gas Association.]

We shall all probably agree that the method of manufacture desired in our industry is one which will enable us to produce continuously, from the least expensive fuels, a gas having such characteristics as local conditions may require. In the gas producer field, we find at hand the instrument which enables us to utilize the inexpensive fuels with very high thermal efficiencies; but producer gas alone will probably never be successfully used for general distribution because of its bulk and low flame temperature. This view is confirmed by recent Mond gas experience in England, which, while perhaps not conclusive, is at least important through showing some of the weak spots. By combining producer gas with other gases, however, we enter at once a very promising field. Many attempts have been made to carburet producer gas; but in every case of which the writer has been able to learn, these attempts have involved intermittent operation, with its many disadvantages. As in ordinary coal gas and water gas practice, the disadvantage of passing periodically from one to another bad extreme of temperature in the gas-making process applies also to the intermittent carburetting of producer gas. It is possible, however, to avoid this objection.

Because producer gas may be made continuously from liquid as well as from solid fuels, it will be seen that producer gas may be considered as a basis for the final product in all parts of the country; and it is the purpose of this paper to show the results we may reasonably expect from the continuous manufacture of a new gaseous mixture, composed of producer gas and hydrocarbons from oils or solids and products of combustion of producer gas. It has always been assumed that the addition of carbon dioxide or of nitrogen to our final product offers nothing but disadvantage. Nevertheless, in view of the many losses due to intermittent operation, the writer has considered the possibility of providing the heat required in carburetting producer gas by burning within the body of gas being made a portion of that gas, and allowing the products of such combustion to remain in the finished product. In spite of the obvious objection to this last-mentioned step, there are accompanying advantages which would apparently make the process worthy of serious consideration. The figures which follow, however, must be understood as being only theoretical, though they are based, as far as possible, upon actually known conditions.

The equipment necessary in carrying out this process is practically that of a carburetted water-gas plant in which the generator is replaced by a producer of the type best adapted to the local fuel, and in which the carburetter is so constructed that the combustion of a portion of the producer gas entering it will have been completed before the products of combustion will have reached the point of the admission of oil. The exact construction would, of course, be determined by the costs and characteristics of coals and oils locally; but this general illustration will serve to make clear the scheme of operation.

While it is possible, within a certain range, to use solid fuels for carburetting, this possibility is avoided in the following calculations, as involving too many uncertainties. Farther along in this paper will be found summaries of a number of calculations representing working results that seem to be possible with three distinctly different types of producer fuel. These calculations have been carried out for gases of three different values with each fuel; and though values higher and lower than those shown may be made with either of the fuels indicated, the range covered is believed to fully meet all demands now in sight. To make it clear that the summaries given are not entirely based on conjecture, the following calculation is submitted as being typical of all from which the summaries are drawn. Naturally, the thermal efficiency of the process, other things being equal, will be highest when the producer gas contains no tarry vapours, as their presence makes it necessary to raise the entire body of the producer gas from the temperature at the producer outlet to that of the fixing of the oil vapours. With a tar-free producer gas, only the portion necessarily burned will be raised in temperature above that of the producer outlet; the balance of the producer gas in the final product being admitted after the carburetting stage. The following calculation is based upon the assumption that our producer fuel is to be a bituminous coal having these characteristics:—

Constituents.	Per Cent.
Moisture	12·43
Volatile matter	32·65
Fixed carbon	45·70
Ash	9·22
Sulphur	1·41

The thermal value of this coal as fired is 11,237 B.Th.U. per pound. The producer gas made shows the following analysis:—

Components.	Per Cent.
CO_2	9·72
O_2	0·12
CO	15·12
H_2	9·98
CH_4	6·00
N_2	59·06

The thermal value of this gas is 151·5 B.Th.U. per cubic foot, corrected to 60° Fahr. and 30 inches barometer. The gas made per pound of coal as fired equals 51·5 cubic feet; and the thermal efficiency of the producer operation equals 68·86 per cent.

There is good reason to believe that this efficiency can be considerably improved in regular practice; but this figure is taken because it is the actual result of operation. The gas leaves the producer at an average temperature of 882° Fahr., and the tar recovered equals 5 per cent. (by weight) of the coal used. The oil employed in this calculation is Beaumont, of 22° Beaumé. The United States Naval Liquid Fuel Board have conclusively shown this oil to have an average thermal value of 19,224 B.Th.U. per pound. Water-gas practice has shown that permanent fixing of the average oil into desirable gases may be accomplished below 1450° Fahr., when the carburettor and superheater have sufficient capacity.

The average product of destructive distillation of gas oil in the presence of inert gases at the correct temperatures may be shown to be as follows:—

Components.	Per Cent.
CO_2	1·266
C_3H_6 (equivalent)	42·627
CH_4	49·488
H_2	6·169
N_2	0·450

The thermal value of this gas at 60° Fahr. and 30 inches barometer is 1612·2 B.Th.U. per cubic foot. The oil above specified will yield the equivalent of 86·771 cubic feet of this gas per gallon, or 11·3278 cubic feet per pound. Good water-gas practice shows that, of the oil used, only 8 per cent. remains unaccounted for.

Because the formation of tar may be entirely, and the formation of lampblack almost entirely, avoided by continuous operation under correct conditions of temperature and pressure, it seems reasonable to assume that we can attain a thermal efficiency of 95 per cent. in the gasification of oil in the presence of inert gases which themselves supply the required heat and temperature. To avoid unnecessary details, we will assume that we now have our plant in operation, with the producer fuel bed and carburettor and superheater at the desired temperatures. Because the sensible heat of the producer gas entering the carburettor is alone not sufficient for fixing the desired amount of oil vapour, we must burn an amount of producer gas which will supply the difference.

We will assume that the gas we desire to make shall have about 675 B.Th.U. per cubic foot. To attain this value, we shall need to have in our finished product 76·65 cubic feet of oil gas for each 51·1 cubic feet of producer gas remaining as such in the final product. As a convenient base, the 51·1 cubic feet of producer gas made per pound of coal is here used. The heat it is now necessary to supply, in addition to the sensible heat of the producer gas, will be as follows: To raise 51·1 cubic feet of this producer gas from 882° to 1450° Fahr. we require 547 B.Th.U.; to raise 76·65 cubic feet of this oil gas from 250° (which temperature is reached by utilizing waste heat) to 1450° Fahr. will require 2785° B.Th.U.; to raise 0·05 lb. of tar vapour from 882° to 1450° Fahr. will require 13 B.Th.U. The heat rendered latent in making the above oil gas equals 2355 B.Th.U.; and that rendered latent in gasifying the above tar vapour equals 17 B.Th.U. The total of the above requirements is 5717 B.Th.U.

Water-gas practice shows that the loss of heat by radiation and convection need not exceed 9 per cent., even with intermittent operation. Adding 9 per cent. to 5717, we have 6232 B.Th.U. to be provided by the actual combustion of a portion of the producer gas entering the carburettor. The value of this gas at 882° Fahr. is 167·8 B.Th.U. per cubic foot corrected. To provide 6232 B.Th.U., we must therefore burn 37,134 cubic feet of this producer gas. Because the air admitted to this producer gas will be under absolute and automatic control, the resulting products of combustion may be calculated, very closely, as follows:—

	Cub. Ft.
CO_2	11·452
N_2	56·027
H_2O	8·162

The water vapour, of course, will condense, and is not carried further in our calculation. It is assumed that the tar gas will be composed of practically equal volumes of hydrogen and marsh gas, and the uncertainty in this connection is covered by an allowance of volume very much less than would probably be obtained in practice.

The original volumes of producer gas and the products of combustion of the additional producer gas burned having now been given the temperature and volume of heat required in fixing the desired amount of oil, they are carried forward to the point of the admission of oil, where they are mechanically mixed with the oil vapours continuously and automatically introduced. On passing through the carburettor and superheater, the oil vapours are now fixed into desirable permanent gases by the heat and temperature supplied by the producer gas and products of combustion. Because of the very intimate contact of this source of heat with every vesicle of oil admitted, this transfer of heat will be very effective, and at the outlet of the superheater we should find the following gases and thermal values:—

	Cub. Ft.		B.Th.U.
Original producer gas (51·10 − 0·06 O)	51·04	..	7,742
Products of combustion	67·48	..	—
Oil gas	76·65	..	123,575
Tar gas	1·00	..	667
Total	196·17	..	131,984

The average thermal value of this gas is 672·75 B.Th.U. per cubic foot, and its analysis should be as follows:—

	Per Cent.
CO_2	8·88
CO	3·68
H_2	5·27
CH_4	21·20
C_2H_6 (equivalent)	16·74
N_2	44·23
	100·00

This gas contains 46·89 per cent. of combustible by volume. The air admitted for secondary combustion in the operation will have been 43·106 cubic feet. The weight of the above gas is 0·076897 lb. per cubic foot, and its specific gravity at 32° Fahr. and 30 inches barometer is therefore 0·9525. The combustion of a cubic foot of this finished gas will require 5·841 cubic feet of air, and will yield the following products:—

	Cub. Ft.
H_2O	0·9789
CO_2	0·8398
N_2	5·0627

The net heating value of this gas is found to be 623·07 B.Th.U. The heat required to raise the products of combustion of 1 cubic foot of this gas 1° Fahr. equals 0·192816 B.Th.U. The flame temperature is therefore 3231° Fahr. To produce 196·17 cubic feet of the 672·75 B.Th.U. gas, we have used:

1 lb. of bituminous coal =	11,237 B.Th.U. (51·1 cub. ft. producer gas).
0·7266 lb. bituminous coal =	8,165 B.Th.U. (37·134 cub. ft. do.).
6·7665 lbs. oil	= 130,079 B.Th.U. (76·65 cub. ft. oil gas).
Total	149,481 B.Th.U. employed in the process.

The gas produced contains 131,963 B.Th.U., and the thermal efficiency of our operation, apart from the raising of steam and the operation of auxiliaries, is therefore 88·28 per cent. Reducing the foregoing figures to the basis of 1000 cubic feet of finished gas, we find that we have made 1000 feet of this gas by consuming 8·8 lbs. of bituminous coal in the producer and 4372 gallons of oil in the carburettor. We have made per 1000 feet of finished gas a total of 449·78 cubic feet of producer gas, of which we burned 189·3 cubic feet in the carburettor. To burn this amount of gas, we admitted 220 cubic feet of air for secondary combustion. For the operation of the producer, we admitted to the fuel bed something less than 335 cubic feet of air and 6·86 lbs. of steam.

It will be noticed that the volumes of air and steam needed per 1000 cubic feet of finished gas are considerably below the requirements of water-gas practice; and, as there are no auxiliaries not required by water gas, these advantages are clearly with this process as against water gas. As the coal can be bought in Chicago for less than $2 per ton, and the oil or its equivalent at not to exceed 3½c. per gallon, we have a total cost of 16·18c. for raw material per 1000 cubic feet of 672 B.Th.U. gas in the holder. As the process is continuous, the labour charge will be considerably below that of coal gas or water gas per 1000 cubic feet. Also, because of the continuous operation, the life of the linings and chequer-brick will be very much greater than the life of water-gas linings or of coal-gas retorts.

With the prices for raw material assumed above, this gas would yield 41,579 B.Th.U. for one cent's worth of raw material. If water gas of this value were made from the same amount of oil, at the same price, and 35 lbs. of coke, at $4 per ton, the cost per 1000 cubic feet for raw material would be 22·3c., the B.Th.U. delivered at the plant for one cent's worth of raw material would be 30,134, and the steam and air required would be about 16 lbs. and 2450 cubic feet respectively. The increased efficiency with which the gases of lower value may be made, and the constantly increasing range in which they are being successfully employed, explain the presentation here of data in connection with gases as low as 288 B.Th.U., as it is the belief of the writer that a great many sets of conditions will be found where it will be advisable, from the standpoint of the consumer as well as of the company, to supply a gas of considerably less than 600 B.Th.U. per cubic foot.

It is not claimed that the process here described is applicable to all conditions, nor that the present details of gas manufacture are not now being carried out along the best lines possible with present processes. The only claim made is that the process involves a new method of gas manufacture, which may or may not be shown of value in practice.

[In a series of tables appended to the paper, the author summarized the results of some of the many calculations made by him in connection with the method of water-gas manufacture described.]

In the course of the discussion on the paper, as reported in the last number to hand of the "American Gaslight Journal,"

Mr. BATTIN said he considered the secret of the success of the process, if it worked out in practice, would be found in the fact of its continuous operation. People who sell producer processes had an old saying that "continuous processes mean continuous profits." There was no question about it, if the temperatures could be kept, as Mr. Lea believed, uniform in a continuous process, the percentage of efficiency obtainable would be very much increased over that of present processes. The secret of the whole paper lay in the paragraph where the author said: "Because the formation of tar may be entirely avoided by continuous operation, under correct conditions of temperature and pressure, it seems reasonable to assume that we can attain a thermal efficiency of 90 per cent. in the gasification of oil in the presence of inert gases which themselves supply the required heat and temperature." This was a rather high percentage to look for; but it was possible to approach it, especially in the case of gas of the lower heat value. In other words, the gas running about 300 B.Th.U. was the more promising field. He believed gas companies would be rather slow to take up a proposition of this kind; but, on the other hand there had been for years attempts made to carburet producer gas by people interested in metallurgical work and in glass furnaces, or similar operations, and he thought that here was a field which was very promising—a chance to make a 300 B.Th.U. gas that would have the advantages all looked for, one of which was that the flame had luminosity. The amount of luminosity in any of the gases that Mr. Lea figured out would probably not be very great, on account of the carbonic acid—in fact, that would work against it in the case of ordinary gas company distribution under the present system. But for the metallurgical work the gas had enough luminosity to make it of value. A point which did not seem explainable was that gas of a certain heat value, giving a non-luminous flame, was not anything like as effective for metallurgical work as one which had a luminous flame; so he thought that here was a place where the process could be tried out.

Mr. J. L. UNGER said that, assuming the efficiencies of carburation and oil gasification were, as stated by Mr. Lea (which he much doubted), and that 6·7665 lbs. of oil = 76·65 cubic feet of oil gas, were added to 51·1 cubic feet of producer gas from 1 lb. of coal, and that these gases must be heated to 1450° Fahr. for complete carburation, the additional producer gas admitted and burned must be 75 per cent. more than he stated, or about 65 cubic feet, instead of 37·134 cubic feet, because Mr. Lea omitted to allow for heat to balance the heat carried out and lost by the products of combustion. Assuming that these products of combustion must be heated to 1550° Fahr., or 100° more than the other gases, in order to allow for heat transfer between them, then the heat required would be—

20·05 cubic feet CO_2 heated 1490°	1,062
98·00 ,, N_2 ,, 1490°	2,810
14·28 ,, H_2 ,, ,,	505
Total heat in products of combustion	4,377
Heat required, according to Mr. Lea, to heat the other producer gas, the oil gas, and the tar	5,717
Total	10,094
Add 9 per cent. for losses	908
Total heat required	11,002

$$\frac{11,002}{167·8} = 65·4 \text{ cubic feet.}$$

Gas will Contain:	Cubic Feet.	B.Th.U.
Original producer gas	51·04 by 151·5	7,742
Products of combustion	118·05 —	0
Oil gas	76·65 ,, 1,617·2	123,575
Tar gas	1·00 —	667
	246·74	131,984

$$\frac{131,984}{246·74} = 535 \text{ B.Th.U. per cubic foot, instead of } 672·75$$

To obtain this thermal value, there were used—

	B.Th.U.
51·1 cubic feet producer gas = 1 lb. of coal	11,237
65·0 ,, ,, ,, = 1·274 lbs. of coal	14,316
76·65 oil gas from 6·7665 lbs. oil	130,079
	155,632

$$\frac{131,984 \times 100}{155,632} = 84·16 \text{ per cent. efficiency, instead of } 88·28$$

This efficiency was still too high, owing to Mr. Lea's assumption of 95 per cent. efficiency of the oil conversion. Mr. Lea assumed that there would be no tar formed from the oil, and that the condition of gas carburation would be more favourable than was the case in ordinary water-gas practice. The process proposed differed from water-gas practice in being continuous, instead of intermittent, which, in some respects, was an advantage. But since he was obliged to admit the oil after the combustion of the producer gas had taken place, he lost the benefit of heat-transfer between the gas and the brickwork that had been heated by the producer-gas flame, and must depend upon his heat-transfer solely from the hot gases of combustion. His carburetting apparatus might be compared with a Lowe water-gas set, in which the carburettor was used solely as a combustion chamber burning the necessary producer gas, and the superheater used as a carburettor for the heating of the oil gases without any admixture of air. It would, therefore, seem that his conclusion, based on water-gas practice—that only 9 per cent. would be lost in radiation and convection during the carburetting—might not be warranted, as the process was different. Mr. Lea evidently obtained his data about temperatures and heat losses from Mr. A. G. Glasgow's paper on "The Practical Efficiency of an Illuminating Water-Gas Setting;" and it might be of interest to point out the efficiency of the oil gasification from Mr. Glasgow's experiments. Mr. Glasgow used a lighter oil than Mr. Lea—consequently, an oil that made more gas per pound. But Mr. Glasgow got only 355 cubic feet of oil gas from 5 gallons of oil, or 10 cubic feet from 1 lb. of oil, whereas Mr. Lea assumed 11·3278 cubic feet. Mr. Glasgow got 1555 B.Th.U per cubic foot of oil gas, whereas Mr. Lea assumed 1612·2 B.Th.U. Mr. Glasgow got 15,550 B.Th.U.

per lb. of oil in his gas, whereas Mr. Lea assumed 18,263 B.Th.U., or a result 15 per cent. higher from an oil inferior to Mr. Glasgow's. The latter estimated the ultimate heat effect of 1 lb. of oil at 20,000 B.Th.U., and got back in his gas 15,550 B.Th.U., or an efficiency in oil gasification of 77·75 per cent. Mr. Lea assumed an efficiency of 95 per cent. Mr. Glasgow got 5 lbs. of tar from 5 gallons of oil, and besides confessed to a loss in a machine of 8 per cent. Mr. Lea got no tar, and estimated his loss at only 5 per cent. Mr. Glasgow used 33·4 lbs. of hard coal per 1000 cubic feet of carburetted water gas, which at 13,500 B.Th.U. was equal to 450,000 B.Th.U.; 35 lbs. of oil per 1000 cubic feet, less 5 lbs. of tar, at 20,000, or 600,000 B.Th.U.; total B.Th.U. required per 1000 cubic feet of gas, 1,050,000. The carburetted water gas of 30 candles, from calculation, contained 764 B.Th.U. per cubic foot, or per 1000 cubic feet, 764,000 B.Th.U.; loss during process, 286,000 B.Th.U., or 72 per cent. efficiency, not figuring on coal used for steam making. Mr. Lea's figure of 88·28 per cent. for producing 672·75 B.Th.U. gas would seem too high for anybody to believe without demonstration from practice. According to his (Mr. Unger's) criticism above, these figures should be 84·16 and 535 respectively—still based on Mr. Lea's assumption of heat efficiencies of conversion.

Mr. HARTMAN pointed out that the "new gas" proposed to be made was almost as heavy as air; and the author said that the additional cost of distribution on this account would be extremely difficult to discover in actual operation. He (Mr. Hartman) disputed this statement. The quantity of gas flow in a given sized pipe varied inversely as the square root of the specific gravity of the gas. In other words, a pipe that would pass 1000 cubic feet of coal gas of ·400 gravity would pass only 550 cubic feet of the proposed gas of ·950 gravity. This difference was so great that one could not fail to notice it in actual operation. Studying the analysis of the gas, it would be seen that the amount of unsaturated hydrocarbons was nearly 17 per cent. The unsaturated hydrocarbons were constituents of comparatively low vapour tensions; and consequently they were more easily driven out of the gas by compression or by a lowering of the temperature. Therefore, it was to be expected that a gas depending for its heating value on so large a percentage of unsaturated hydrocarbons would not hold its heat units under compression in high-pressure distribution, or under exposure to cold in high or low pressure distribution, nearly as well as coal gas or water gas made according to present practice. The method might find a very profitable field in metallurgical work; but he did not believe it was practicable in competition with the present coal-gas or water-gas manufacture.

Mr. LEA said that, in giving the cost of 22 c. per 1000 cubic feet for raw material, he certainly did not mean to say that 22 c. was the lowest cost reached in practice. The figures were given only to show relative costs under specified conditions. If he wanted to show the cheapest, he would not take oil costing 3½ c. for instance. As to Mr. Unger's criticism, he (Mr. Lea) had based his contentions on the fact that producer gas has a certain value—say, 135 B.Th.U. per cubic foot. Mr. Unger said to burn this gas it was necessary to allow for the amount of heat required in raising the temperature of the gas, together with the air consuming it; and he (Mr. Lea) maintained that was incorrect, because no gas has any given value until one has already made allowance for the raising of the gas and air required in combustion to the temperature of combustion. Consequently, the value of 135 B.Th.U., or whatever other figure was used, would cover the loss that Mr. Unger pointed out. He said, too, that before heat could be transferred from the producer gas to the oil gas, the producer gas must be 100° higher in temperature. The difference in temperature between the heating and the heated gases would, of course, be determined by the relative volume—other things being equal; but it was not possible to say what this difference would be. On the other hand, 1450° would be found higher than was required in many cases. Mr. Unger objected to the assumption of 95 per cent. efficiency in the transformation of oil into gas. The 95 per cent. was based upon the condition that the heat required and the temperature required must be obtained from the accompanying producer gas and produce the combustion; and the difference between the 95 per cent. and the total of 100 per cent. was only the amount of the oil that remained unaccounted for. Mr. Unger compared the figures given in the paper with these found in Mr. Glasgow's paper. He (Mr. Lea) had studied Mr. Glasgow's paper, but had not used Mr. Glasgow's oil figures, since he was not using Mr. Glasgow's oil. He simply specified in his calculation the oil he was using. It was not to be expected that the various steps might be fairly compared in detail with those of water-gas practice, since one process was intermittent and the other continuous.

Installations of Large Gas-Engines.—In the course of a paper on "The Nürnberg Gas-Engine," read by Mr. R. Bechtel before the Birmingham Association of Mechanical Engineers, the author gave a table showing the number of gas-engines of 1000 H.P. and upwards installed throughout the world up to the 15th of August last year. The total is 628, of which 129 were supplied by the Nürnberg Company. The Snow Steam-Pump Company, of Buffalo, come next with 60, and the Allis Chalmers Company, of Milwaukee, follow pretty closely with 46. The statistics tabulated by the author showed that the combined output of these engines is rather more than 1,035,000 B.H.P.

MANCHESTER JUNIOR GAS ASSOCIATION.

Visit to Messrs. W. J. Jenkins and Co.'s Works at Retford and to "The Dukeries."

Members of the above-named Association last Saturday paid a visit to Retford, and after an inspection of the works there of Messrs. W. J. Jenkins and Co., Limited, spent the afternoon in a drive through "The Dukeries;" returning home in the evening from Worksop by rail. The party was not a large one, considering the attractive programme; this being due, no doubt, to the difficulty which a great many of the members found in arranging to join up from their respective towns with the main body—the railway facilities from a number of places, including Manchester, leaving much to be desired. At Retford, it was found that 35 of the members had made the journey; those present including Mr. J. Taylor, the President of the Association, several members of the Council, the Hon. Treasurer (Mr. R. H. Garlick), and the Hon. Secretary (Mr. J. Alsop).

The "Beehive" works of Messrs. Jenkins are situate not far from the railway station; and when the party reached them shortly after midday, it was to find the three hundred men and boys at work. Mr. W. J. Jenkins, the Managing-Director of the Company, extended a cordial welcome to the party; and then a tour of the works was made under the guidance of Mr. Jenkins and the following members of his staff: Mr. P. Fishburne (Secretary), Mr. W. Dallis (Outdoor Superintendent), and Mr. R. A. Williams, (Chief Draughtsman). What struck the visitors most in the inspection of the works was the skilful manner in which an old building had been modernized for the purposes of an up-to-date gas engineering firm; the general equipment of the whole place for the efficient and economical turning-out of the work in hand; the extreme orderliness of everything in the different departments; and the seemingly most comfortable conditions under which the men laboured.

The special machines which the firm have for dealing with the "D.B." hot-coke conveyor chain, of which several miles are turned out yearly, were seen at work; but it was in the erecting shop where most of the time was spent. Here were seen stoking machinery and conveyors in various stages of completion; also a retort-house equipment for Japan. A demonstration was given with a large "D.B." charging-machine, constructed for the Alliance and Dublin Consumers' Gas Company. This machine, which is fitted with elevators for taking coal from the floor level, and is arranged to work on settings of ten retorts in five tiers, discharged 10 cwt. of coal into a dummy retort in 25 seconds; the fuel being forced along with tremendous velocity like water from a hose-pipe. It is claimed for the "D.B." machine that the whole operation of charging a retort 20 feet long takes from 20 to 25 seconds only, and it is stated that it may be done more quickly if desired.

At the conclusion of the inspection, the party adjourned to the large drawing office, where light refreshments were served. In this room there hangs a map of the United Kingdom, showing by distinctive marks towns where the firm's machines have been installed, from Alloa in the North to Hastings and St. Leonards in the South; while an accompanying scroll indicates places in the Colonies and abroad from which orders have been received and executed.

It was after two o'clock that the drive to "The Dukeries" was commenced; the route being by Babworth to Edwinstowe, where a halt was made for tea at the Royal Oak Hotel. Prior to the party leaving the dining-room, a few speeches were made.

Mr. W. J. Jenkins, in the course of his remarks, expressed the hope that the members, in their inspection of the Beehive Works had seen something which had interested them—adding that it had been a pleasure to him and to his colleagues to welcome them, and show them round. When he first went to Retford, more than eleven years ago, feeling ran very high on the question whether or not the town should develop on manfacturing lines. For a time there was what he might call the "tall chimney" party and the "residential" party; but to-day he believed there was only one party, and that was the former. Being connected with the gas industry, they at the Beehive Works tried their best to keep down smoke; but he was afraid that at times they broke the rules, because they were not so strictly kept up to the mark as they might be. He referred in complimentary terms to the way in which the affairs of Retford were managed; and he specially mentioned the name of Mr. J. B. Fenwick, the Engineer and Manager of the gas and water works.

Mr. C. E. Teasdale (Salford), in moving a vote of thanks to Messrs. Jenkins and Co. for their courtesy and kindness in showing the members over their establishment, said the outing that day would rank as one of the most successful the Association had had. They were especially indebted to Mr. Jenkins, Mr. Fishburne, Mr. Dallis, and Mr. Williams for showing them over the works, explaining the different processes, and supplying information regarding the work in hand. With the vote, Mr. Teasdale coupled the names of Mr. J. T. Lister, the Assistant Managing-Director of Messrs. Jenkins and Co., and Mr. Fenwick.

Mr. R. H. Gimson (Birkenhead), in seconding the vote, cordially associated himself with the remarks of the mover. He complimented the Council of the Association on having arranged such an excellent programme, and expressed the hope that Retford

might very soon have more tall chimneys, if only at the works of Messrs. Jenkins and Co.

The President, in putting the resolution, expressed his appreciation of the kindness shown by Mr. Jenkins and his assistants; these gentlemen having spared no pains to make the inspection of the works of interest to the members. He added that what they had seen proved that Messrs. Jenkins were one of the foremost gas-engineering firms in the country.

The resolution having been carried with acclamation,

Mr. Jenkins briefly responded on behalf of himself and his firm.

Mr. Fenwick also acknowledged the vote; thanking the mover and seconder of the resolution for having included his name in it. He expressed the hope that the members of the Association had benefited by their visit and by what they had seen. He said he trusted that at some future date they would inspect his "little gas and water works." It was true he had not much to show them; but, as they knew, they could always learn something, even at a small works.

This concluded the proceedings at the hotel. The party then walked to the "Major Oak," and afterwards joined the brakes for the drive to Worksop to take the train for home.

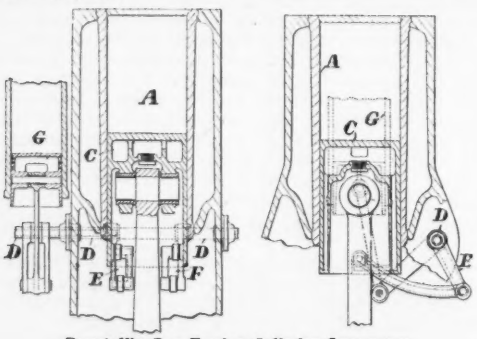
REGISTER OF PATENTS.

Scavenging Gas-Engine Cylinders.

BURSTALL, F. W., of Birmingham University.

No. 10,443; May 14, 1908.

According to this invention, an auxiliary cylinder for providing air under pressure is combined with the hollow rocking-shaft of the engine so as to be operated from the movement of the shaft, to provide a practical method of working the cylinder without any complications in construction. It is said to be preferable to provide the auxiliary air cylinder parallel to the axis of the power cylinder, and to connect the piston to the rocking-shaft by a crank or arm and connecting rod, the axis of the rocking-shaft to be (as usual) parallel to the crank-shaft of the engine. The illustration shows sectional elevations at right angles to each other.



Burstall's Gas-Engine Cylinder Scavenger.

The power cylinder A, the water-cooled piston head C, the hollow rocking-shaft D, and two sets of hollow links coupling the rocking-shaft to the piston (both mechanically and in a water supply sense) E and F, are features well known in engines of this kind, and by themselves form no part of the invention. One side of the shaft D serves for the introduction of cold water through the one set of links, and the other side as an exit for the hot water through the other set of links; one set communicating with the inlet passages to the hollow piston head and the other communicating with the exit passages from the hollow piston head, in the usual well-known manner.

G indicates an auxiliary cylinder for providing air under pressure for scavenging and other purposes—such, for instance, as supplying air to a container to be used in the cylinder as part of an explosive charge. This cylinder is in any convenient way made part of the engine; but it is preferably arranged as indicated, so that its axis is parallel to the axis of the power cylinder. The piston of this auxiliary cylinder is connected with the rocking-shaft D by a connecting rod and cranks or arms, so that, when the shaft moves, a reciprocating motion is imparted to the piston—the throw of the crank and the length of the connecting rod being anything suitable for the purpose.

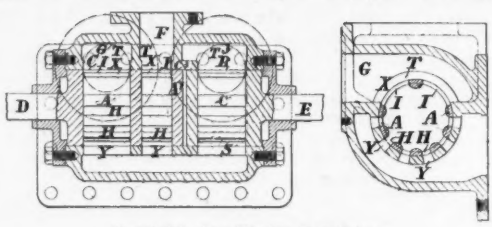
Rotary Valves of Gas-Engines of the Scavenger Type.

BURSTALL, F. W., of Birmingham University.

No. 10,444; May 14, 1908.

This invention relates to a circular hollow valve for regulating the supply of air and gas to a gas-engine in proportion to the load upon the engine. It is circular in section, and has a number of narrow ports in its lower side parallel to the axis of the valve, and on the upper side wide ports for the admission of air or gas; and it is divided into two parts, separated by a plate, so that air enters into one compartment of the valve and gas the other. The amount of rotation of the valve is so placed under the control of the governor that the quantity of air and gas taken in is proportional to the load. A second valve of precisely similar construction to the gas and air valve, and lying in the same casing, is opened through a definite amount by means of a movement from the half-speed shaft, and not under the control of the governor.

In the longitudinal and transverse sections shown, A is an air and gas regulating valve, and C is a separate scavenging or air valve—both quite independent, but arranged in the same general casing, which is adapted to communicate on one side with a cylinder or mixing-chamber fed on the other side T with air and gas. Both valves A and C are circular and hollow, and axially in line. The former is partly rotated from the shaft D, which is moved from a suitable governor control mechanism; and the latter from the shaft E, which is moved from a half-speed shaft. The valve A is longitudinally partitioned off, by a



Burstall's Gas-Engine Regulator.

plate, into two chambers, one of which provides an air-chamber, and the other a gas-chamber. The gas-inlet is at F, and the air-inlet at G. Each chamber has a number of narrow and wide ports H I through its longitudinal walls, with corresponding wide and narrow ports X Y through the casing, so that there is a free entrance of the gas and air into the interior of the circular hollow valve, but a regulated exit from it to the cylinder or mixing-chamber, by the more or less opening or closing of the narrow ports. The valve C and its casing part are all of precisely similar construction to the valve A; the entrance for the air being at J and the wide and narrow ports at R S.

The working of the two valves in the one casing is as follows: The mixing valve A is rotated from the shaft D and the scavenging valve C from the shaft E—quite independent, but timed to each other. Both valves are shown open to the side of the cylinder; but they are never in this position at the same time. The engine works on the four-stroke cycle; and one valve is always shut when the other is open. Thus during the suction stroke the scavenger valve C is closed, at which time the gas and air valve A is open. When the gas and air valve shuts, the scavenger valve opens, during the exhaust stroke; so that the two valves are never open at the same time. The valve C is rotated through a portion of the arc of a circle by the usual lever actuated by a cam on the half-speed shaft. The valve C opens during the exhaust stroke of the engine in order to clear out the products of combustion—the scavenging air being under pressure; but it may open at any other period except when the valve A is open.

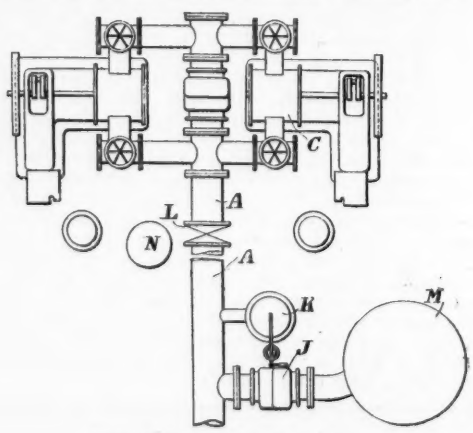
Bye-Passing a Town's Gas-Making Plant.

WALLER, E. B., of Brimscombe, Glos.

No. 10,501; May 14, 1908.

The object of this invention is said to be "to provide an improved bye-passing arrangement of the type in which the pressure in the hydraulic main may be prevented from rising substantially above atmospheric if the exhauster fails, so that excessive leakage of gas into the retort-house may be avoided."

The patentee proposes to provide in a town's gas-making plant, a bye-pass valve controlled by a separate automatic sensitive governor placed between the hydraulic main and the exhauster; this bye-pass valve being opened by the governor to blow-off the gas when a predetermined pressure is exceeded, and to deliver the gas either into a balanced bell holder or to a chimney shaft. Thus, in the event of one or more of the exhausters failing, the gas produced by the retorts (or, if one exhauster is still in operation, the surplus gas over that with which the exhauster can deal) may be taken off for subsequent collection, or delivered into the atmosphere through a chimney shaft.



Waller's Bye-Passing Arrangement.

As shown, there is placed between the hydraulic main and the exhausters C a bye-pass valve J, in a branch from the pipe A. The valve is controlled by a governor K, influenced by the pressure of gas direct from the hydraulic. The valve preferably blows off at little above atmospheric pressure; and the blow-off may lead either into an overbalanced bell holder M (so as to create the slight vacuum desirable) or else to a chimney shaft; so that, in the event of the main exhauster failing, the gas produced by the retorts may be taken off for subsequent collection, or may be delivered into the atmosphere at a level above the

retort-house until the exhauster is started again, or until the heat from the fires has been diverted from the retorts.

In the event of a breakdown, the governor K and valve J prevent the pressure in the retorts from rising sufficiently to permit of blowing past the seals in the hydraulic main and to cause excessive escape into the retort-house.

A full-bore valve L, operated by a regulating governor N, is preferably connected by a separate pipe to the hydraulic main, although the valve itself is in the main connection A to the exhausting machinery. Consequently, the governor maintains a steady pressure by varying the amount of opening of the valve L.

Treating Sulphate of Ammonia.

ENGLAND, R., of Mark Lane, E.C.

No. 10,781; May 18, 1908.

The ordinary sulphate of ammonia of commerce, the patentee points out, contains free sulphuric acid and moisture in quantities liable to cause injury to packages in which it is stored for transport—particularly when in the form of bags. Furthermore, the presence of the free acid is detrimental when the sulphate is directly applied to the land as a fertilizer. His invention, therefore, to obviate the disadvantages named, comprises a treatment of the ammonium sulphate whereby practically all the free acid is neutralized and a part of the moisture is absorbed; "the resulting product being a salt which is not only more suitable for transport, but is also better fitted for direct use as a fertilizer than the ordinary sulphate of ammonia of commerce."

He proposes to add to ordinary commercial sulphate of ammonia phosphatic material in a dry and fine powdery condition, which can appropriate the free acid and absorb moisture. For instance, any one or more of the following substances may be employed: Dry, finely ground degelatinized bone, calcined bone finely ground, or precipitated or alkaline phosphates. The mixing of the material with the sulphate may be done mechanically or by hand, and at any time after the sulphate is removed from the saturation tank or other plant. Furthermore, the proportions of the material added to the sulphate may vary according to the condition of the salt treated. It is found that 1 per cent. suffices in some cases.

The result is said to be a drier and more neutral salt than the ordinary commercial salt, whereby it is possible "to effect economy in cost of packages for transport and to diminish waste and loss of weight." The free acid may also be utilized economically for rendering the phosphate in the material used more or less soluble—thus "adding to the manurial value of the sulphate, which is, moreover, rendered more suitable for direct application to the land as a fertilizer than the usual commercial salt."

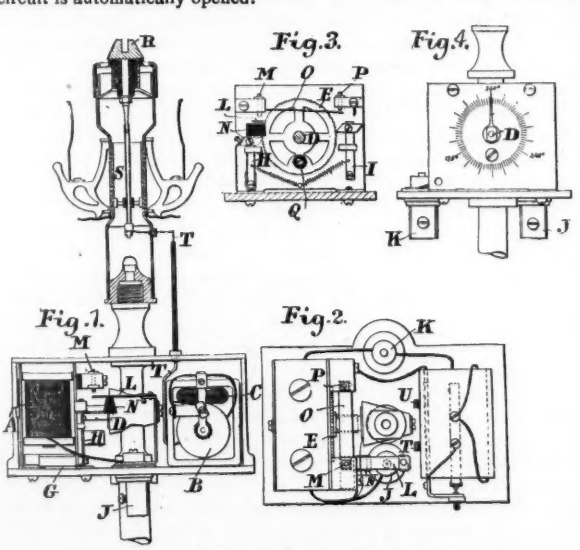
Lighting and Extinguishing Gas-Lamps from a Distance.

GROSSMANN, A., of Rheydt, Germany.

No. 24,925; Nov. 19, 1908.

This invention relates to systems for lighting and extinguishing gas-lamps from a distance, "in which no pilot-burners but spark-gaps are employed for igniting the gas or mixture of air and gas."

In order to avoid contact between the primary circuit of the induction coil and the casing of the mechanism in each gas-lamp, the primary circuit of the induction coil and the circuit of the electro-magnetical device are connected in multiple with the two binding posts; and current is supplied to the spark-gap through a special insulated conductor forming part of the secondary circuit. There are means for closing the primary circuit of the induction coil only during the period in which the sparks are required for igniting the gas—that is, during the opening of the gas-cock or valve, so that afterwards the primary circuit is automatically opened.



Grossmann's Lamp Lighter and Extinguisher.

Fig. 1 is an elevation of an incandescent gas-lamp with an electro-magnetic device and induction coil; the burner with the spark-gap being shown in section. Fig. 2 is a plan of same; the burner and a bridge over the electro-magnetic device and induction coil being omitted. Fig. 3 is a vertical section through fig. 2. Fig. 4 is an elevation of the parts shown in fig. 2, when looked at in the direction from left to right.

The example shown is a gas-lamp with a single burner. Between the gas inlet tube and gas-cock is a casing with two electro-magnets A and an induction coil B and a condenser C. A shaft D is mounted to turn in the casing, and is so coupled with the plug of the gas-cock as to take it along with it on being turned. The shaft carries on its inner end a large ratchet-wheel E, and on its outer end an indicator moving over a scale F, and indicating thereby the angle in degrees. The armature G is assumed to be pivoted in the casing and provided on its free end with a projection, which passes through a slot and carries a vertical rod H pivoted to it. The upper part of the rod is bent, and carries a pawl and a pusher of insulating material. The pawl engages the teeth of the ratchet-wheel E, and the rod H is pressed towards it by a helical spring. Another rod I, pivoted to the casing, carries a pawl engaging the ratchet-wheel E, and is pressed towards the latter by a helical spring.

It will be understood that the ratchet-wheel E can be turned only in one direction, and that the electro-magnets A, on being energized, will attract their armature G, so that one pawl will feed the ratchet-wheel one tooth forward, while the other pawl rides over the back of the respective tooth until it engages in the following space. On the electro-magnets becoming without current, the armature will, by reason of its weight, drop, so that the first-named pawl rides over the back of the respective tooth until it engages in the following space; the ratchet-wheel E being during this period prevented from moving by the other pawl.

The circuit of the electro-magnets A and the primary circuit of the induction coil B are connected in multiple with the two binding posts J K. The first cut-out L M can be closed by the pusher N on the electro-magnets being energized. The second cut-out O P can be closed in the following manner: The ratchet-wheel E carries insulated from it a roller; and during the rotation of the ratchet-wheel through an angle of (say) 30° or 40° the roller Q presses the contact spring against the contact screw while bending the former. As long as the second cut-out is in its normal position, any impulse entering the binding post J will only pass through the circuit of the electro-magnets to the other binding post K. Then the energized electro-magnets will attract their armature G and feed the ratchet-wheel E one tooth forward; at the same time the pusher N connected with the rod H will push the contact spring against the contact screw M—in other words, it will close the first cut-out. However, the primary circuit will not be thereby closed, as the second cut-out is still open. When the impulse ceases, the electro-magnets, becoming without current, release their armature G. Obviously a number of impulses equal to the number of the teeth of the ratchet-wheel requires to be sent through the electro-magnets for feeding the ratchet-wheel forward tooth for tooth until it completes one revolution. When the roller Q closes the second cut-out, each impulse will first energize the electro-magnets and close, by their armature and the parts H N, the first cut-out, whereupon a part of the impulse passes through the primary circuit now closed by the two cut-outs for operating the induction coil B.

The secondary circuit of the induction coil is constructed as follows: Two parallel vertical rods fastened on the outside of the casing and insulated are connected with the two ends of the secondary winding of the induction coil. A metallic disc R fastened on the burner is insulated from it—resting on an annular piece of soapstone and with its shank terminating in a tapering point which is in electrical contact with a metallic tube S, the lower end of which is electrically connected with the rod T by a line. The disc R forms one terminal of a spark-gap, the other terminal of which is formed by a tube electrically connected with the other rod U. During the passage of an impulse through the primary circuit, sparks will be produced between the two terminals and serve for igniting the gas as it passes upwards.

The electro-magnetic device described is substantially the same for every gas-lamp comprised in the system—no matter whether it has only one or several burners; but certain modifications of the device in the latter case will be required. The gas-cocks and their plugs will have to be varied in construction in accordance with the points of time at which the gas is to be lighted and the light extinguished.

APPLICATIONS FOR LETTERS PATENT.

12,714.—BIRCH, G., DUDLEY, S., and DOXEY, A. S., "Bunsen burners." May 29.

12,740.—CROSSLEY, K. & I., and REEVES, A. W., "Internal-combustion engines." May 29.

12,742.—GEARINS, A. D., FULLWOOD, W. B., and BOUCHER, P. J., "Manufacture of coke and gas, the construction of gas-retorts, and recovery of bye-products." May 29.

12,755.—ROBIN, J. I., "Mantles." May 29.

12,770.—DOLPHIN, A. R., "Generating gas for power." May 29.

12,785.—FOUCAR, J. L., "Fuel for gas-fires." June 1.

12,938.—WHITE, T. W., "Jointing of pipes." June 2.

12,940.—GÖRITZ, F., "Water-cooled gas cut-off valve." June 2.

12,946.—GIBB, A. L. S., "Meter for fluids." June 2.

12,991.—CONTI, A., and GALLI, A., "Automatic kindling and extinction of gas-lamps." June 2.

13,026.—CLIMIE, W., "Gas-producers." June 3.

13,048.—POTTER, W. G., "Water-main for supplying tap water to the public and motive power for driving purposes." June 3.

13,049.—POTTER, W. G., "Water-meters." June 3.

13,058.—GUNNING, J., "Inverted gas-lamps." June 3.

13,130.—WOLF, O., BAMBURY, N. F., and BERNARDY, E., "Mixing and supplying air and gas." June 4.

13,152.—JEFFERY, H., "Self-fitting split double collar or clip for repairs to mains and pipes." June 4.

13,186.—PALATINE ENGINEERING CO., LTD., BLAKESTON, R., and ANTHONY, T. E., "Liquid meters." June 5.

13,226.—STANSELL, R.A., "Acetylene generators." June 5.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Young-Glover-West Process.

Sir,—In the discussion which followed Mr. Thomas Glover's paper read before the Institution of Gas Engineers in 1906, I said that I did not consider that the mere preparation of a paper and the making of drawings was sufficient to justify the claims made for the hypothetical Young and Glover process. When the process was in operation, we should be in a much better position to consider and discuss it.

Three years have elapsed since then; but the articles now published in your issue of June 8 furnish the fullest justification for my remarks in 1906, as it is now clear that every original claim of the Young and Glover process has been abandoned.

What is not made clear, however, is that the system as now worked, and which has apparently met with some measure of success, is the Woodall-Duckham system pure and simple.

H. W. Woodall.

Bournemouth, June 12, 1909.

[In view of the importance attaching to (particularly the last paragraph of) the above letter, and in view, too, of the discussions on carbonizing at the meeting of the Institution this week, it was considered only fair to Messrs. Glover and West that they should have an opportunity of publishing a reply simultaneously with Mr. Woodall's letter. A copy of the letter was therefore forwarded to them; and we are, as the result, requested to publish the following answer.]

Sir,—Referring to Mr. H. W. Woodall's letter, we cannot allow the conclusions he has arrived at to go unchallenged.

The system of vertical retorts in operation at St. Helens is the outcome of the Young and Glover patent, and the system of continuous carbonization perfected by the late Mr. Young years before the Woodall-Duckham methods were developed.

Further the main features of the Glover and West system—included in which are the method of feeding the retorts by gravitation, the method of heating, and the method of discharging the coke, all of which are a great success and are also covered by patents—are absolutely and entirely different from the Woodall-Duckham system.

It is not, however, our intention to discuss, or elaborate upon, the matter in the Technical Press. Suffice it to say, we repudiate entirely Mr. Woodall's unjustifiable and erroneous assertion at the conclusion of his letter; and if the patentees of the Woodall-Duckham system imagine that their rights are in any way affected, we are quite prepared to defend our interests in the proper quarter.

John West
Samuel Glover.

June 14, 1909.

Vertical Retort Patents.

Sir,—From the almost weekly records in the "Journal," it would appear that one has only got to launch out with a good invention, and a valuable patent, and then at once lose sight of the eighth and tenth Commandments. The protection for a prior patent obtained, the infringer entirely ignores.

Messrs. Settle and Padfield, the pioneers of the vertical retort system as now practised, were granted their patent for England on June 2, 1902, for Germany on June 3, 1903, for France on May 20, 1903, and for the United States on May 25, 1903, with fifteen other patents in other countries and colonies by May, 1904. One of the most eminent Counsel on Patent Laws—at the time—was engaged to give an opinion upon the Settle-Padfield patent. An extract from Counsel's opinion runs as follows: "This being so, I am of opinion that the letters patent are valid, and would be supported by a Court of Law."

Such an opinion, of course—without litigation for rights of patent—cannot benefit the "first and true inventor," which is the strong point the infringer invariably works upon, in first satisfying himself that the true inventor has not got the money strength to fight for what is already his own. Consequently infringements such as we see daily, almost, go ahead unmolested.

T. Settle.

June, 1909.

Mr. J. H. Brown and Vertical Retorts.

Sir,—In the report of the Gas Committee of the Corporation of Nottingham, a copy of which appeared in your issue of the 8th inst., there occurs the following paragraph with reference to the Dessau vertical retorts:—

> "Unfortunately, by this system, considerable difficulty is experienced in producing gas of sufficiently high illuminating power to comply with the standard to which your Committee are now working."

As the Corporation of Nottingham are not working to any unusually high standard of illuminating power (for this country), the paragraph would naturally lead any gas engineer to suppose that the Dessau system does not lend itself to the production of (say) 16-candle power gas.

I shall be much obliged if you will kindly let me state that the paragraph in question can only be based upon certain tests which the Nottingham people carried out at Dessau in April and May of last year. These tests were not satisfactory as regards illuminating power; but as I have already pointed out to Mr. Brown, and as he himself practically admitted in the course of the discussion on Mr. Hayman's paper at the last meeting of the Institution of Gas Engineers, the conditions were such as to injuriously affect the result.

Further, in fairness to the Dessau Company, I would like to state that throughout the whole of the correspondence which I had with Mr. Brown subsequent to the results of the tests being known—extending over some five months—this point was never raised; and although the Dessau people were asked to tender for an installation, no guarantee was ever asked for with regard to illuminating power. Had any such guarantee been asked for, there would have been no difficulty in meeting the Nottingham Corporation in the same way as the Sunderland Gas Company were met upon the same point.

Charles Hunt.

Victoria Street, S.W., June 12, 1909.

The Relative Costs of Gas and Electricity.

Sir,—I have noted your reply to my letter published in your last issue.

The calculations you give in your reply are, of course, very interesting and very theoretical; but I entirely fail to see how you can expect to refute actual results by mere hypothetical figures. We have many cases here where electricity has proved to be cheaper than gas for lighting purposes; the illumination given being, in the consumers' opinion, quite as good, and in the majority of cases better, with electricity than with gas. After all, he is the man both the Gas Company and this Department have to serve and satisfy; and no amount of contentious letter-writing in the "Journal of Gas Lighting" will alter his opinion.

Regarding the particular case to which I referred in my last letter, you say that there must be some other explanation than "electricity is cheaper than gas" for the big discrepancy in cost in favour of electricity. I note, however, that even your inventive powers are apparently at a loss to suggest one. To my mind, the explanation of the whole business is that the figures given in your paper and by the gas companies for the consumption in cubic feet per hour for the different burners are not, and never have been, obtained in ordinary practice; and that the cases I have quoted to you bear out my opinion, you can but admit.

H. H. Holmes, Sales Manager,
West Ham Corporation Electricity Department.

June 9, 1909.

[Our correspondent possesses among his gifts the one of being able to bye-pass unflinchingly all awkward points; and he thinks it sufficient to bury calculations that cannot be refuted beneath the weight of such terms as "theoretical" and "hypothetical." This is an interesting characteristic; but it is not a convincing one in its application. Now permit us to say, Mr. Holmes, that there was not a single theoretical or hypothetical calculation submitted in our reply last week. We are constantly realizing those figures in ordinary practice, and, to our own knowledge, so are many other consumers who use gas in a manner that will give them the greatest amount of illumination for the money expended. Mr. Holmes's expressions will not fit a condition of things that actually exists—perhaps not in his mind, but in many other homes with which we have personal acquaintance, otherwise than from the reports of gas inspectors. If he will only look for it, the evidence of a widespread practical experience as to what gas is doing day by day is at his command. But, we ask him, which of the figures quoted last week, he believes are theoretical and hypothetical? Is the calculation of 800 candle-hours per unit of electricity used with the Osram metallic filament lamp? We think not; for it is a figure proved by practical experience and photometrically. Beyond it with a unit of electricity it is *impossible* to go in ordinary practice; beyond 8800 candle-hours for 2s. 9d. worth of electricity in West Ham it is *impossible* to go. Is there anything theoretical so far? Up to 20,000 candle-hours with 2s. 8d. worth of gas it is *possible* to go. And the man is foolish who does not use proper burners, and give them a moderate amount of attention, to get that efficiency. Does Mr. Holmes say this possibility does not exist in gas? If so, we shall be pleased to arrange to show him the contrary with ordinary burners, if he will permit us to publish his testimonial to the effect that he is satisfied. If it exists, it is neither theoretical nor hypothetical. Our correspondent says that, to his mind, the figures given in the "Journal" and by gas companies for the consumption in cubic feet per hour with the different burners are not, and never have been, obtained in ordinary practice. Mr. Holmes is as one who sits in darkness. He harbours disbelief—in his mind; but he does not go to any trouble to confirm himself in it, beyond the bare assertions of certain users (but laymen in the science) of artificial lighting. We should like an opportunity of getting him on a photometrical test with ordinary burners and mantles; so as to do something towards having a part, if not all, of these cob-webby disbeliefs cleared from his mind. Mr. Holmes does not grasp with avidity, and deal with, the fact that, if these consumers are getting "the same illumination, and in the majority of cases better, with electricity than with gas" used in incandescent burners, he has to defend the absurd illuminating efficiency of between 2 and 3 candles per cubic foot of gas consumed. Mr. Holmes is most careful not to show any disposition to be seen attempting anything so idiotic as the defence of this point, which is important as following from the general statement. Consumers who say it is a fact they get quite as good, and in the majority of cases better, illumination (for, we presume, equal expenditure) with electricity than with gas, accuse themselves of lamentable negligence and wastefulness; and their testimony is not of the slightest value. We have made inquiries as to the accuracy of the figures as to gas quoted by the consumer whose testimonial Mr. Holmes included in his letter

last week; and the gas figures are correct. The consumption for the past nine quarters by this consumer has been as follows:

1907: Ladyday, 15,400 cubic feet; Midsummer, 12,000 cubic feet; Michaelmas, 9000 cubic feet; Christmas, 15,800 cubic feet.

1908: Ladyday, 15,400 cubic feet; Midsummer, 8400 cubic feet; Michaelmas, 4500 cubic feet; Christmas, 900 cubic feet.

1909: Ladyday, 1200 cubic feet.

So that he has not forsaken gas altogether; and his consumptions before using electricity show rather variable effects—for example, between the two summer quarters of 1907; and between the midsummer quarters of 1908 and 1907. The electric lamps were put in in August, 1908. This point indicates that the consumer did not exercise any great control over his gas lighting. On investigation, we find that he did complain early in 1908 that he had a big escape of gas in the house on his private fittings, but to what extent cannot now be traced. The house it is also seen is at least a ten-roomed one; so that the gas account for the winter half year would not appear to have been anything very excessive. The whole of the house was lighted with incandescent burners, upright and inverted, which the consumer maintained personally. He does not appear to be particularly well disposed towards the Gas Company. Just as thousands of the householders in West Ham are favourable to gas, this particular one is favourable to electricity. His average weekly gas consumption in the winter quarters of 1907-8 was about 1200 cubic feet; his electricity consumption an average of 4·3 units! We assert that an average of 4·3 units of electricity for seven days' lighting in a ten-roomod house in the darkest months of the year, will not give anything like the same illuminating power as an average of 1200 cubic feet of gas. Mr. Holmes cannot deny that at most, with 4·3 units of electricity, 3466 candle-hours can be obtained; and that it is possible to get 24,000 candle-hours with 1200 cubic feet of gas, if good inverted burners are used. The consumer is deceiving himself and the easily satisfied Mr. Holmes; or the only possible, and then only partial, explanation is that the consumer's burners were allowed to get in a most deplorable condition, that he used his gas-burners to a larger extent and for more hours than electcity, and that he exercised no control over them.—ED. J.G.L.]

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills reported, with amendments: Blackwood Gas Bill, Bungay Water Bill [Lords].

The Bill of the Gaslight and Coke Company was set down by order for the third reading stage at the commencement of private business last Tuesday; but, Mr. W. Thorne again formally objecting, its consideration was further postponed until the 17th inst.

Last Thursday, Captain Clive asked the President of the Local Government Board if his attention had been called to the resolutions passed by several Boards of Guardians in London protesting against the action of the Metropolitan Water Board in granting to their Chairman an annual salary of £500 for the purpose of defraying the expenses of the official hospitality of the Board; and if he would use all the influence and the powers he possesses to prevent it. Mr. Burns, in reply, informed the gallant member that sub-section 4 of section 1 of the Metropolis Water Act, 1902, empowers the Board to pay a salary to their Chairman, and said it was in the exercise of this power that the Board had recently voted a salary. He added that he understood a certain number of Boards of Guardians had passed resolutions to the effect stated in the question; but they had not been brought under his notice, and he had no authority to interfere in the matter.

The Earl of Dudley has withdrawn his petition against the South Staffordshire Water-Works Bill, the promoters of which have petitioned against the Stourbridge and District Water Board Bill; and the Dublin Port and Docks Board have petitioned against alterations in the Alliance and Dublin Consumers' Gas Bill.

PRESTATYN URBAN DISTRICT COUNCIL BILL.

Local Legislation Committee.—Tuesday, June 8.

(*Before Sir* FRANCIS LAYLAND-BARRATT, *Chairman*, *Mr.* ERNEST GARDNER, *Mr.* COOPER, *Mr.* HARRISON BROADLEY, *and Mr.* MANFIELD.)

Authority is sought in this Bill to transfer the undertaking of the Prestatyn Gas Company to the Prestatyn Urban District Council, to confer upon the Council further powers in relation to the supply of gas and water, and for other purposes.

Mr. WEDDERBURN, K.C., and Mr. F. N. KEEN appeared for the Urban District Council. The Hon. J. D. FITZGERALD, K.C., Mr. RAYMOND ASQUITH, and Mr. RABAGLIATI represented Lady M'Laren; Mr. JOSEPH SHAW, the Ecclesiastical Commissioners; and Mr. J. B. ASPINALL, the Earl of Plymouth. Mr. BOYCE (Local Government Board) was also present.

Mr. WEDDERBURN, in opening the case for the promoters, said this was an omnibus Bill. By Part 2 it proposed to transfer the gas undertaking to the Urban District Council, and Part 3 dealt with certain powers as to the supply of gas which would be consequent upon the transfer. Part 4 had reference to the increased water supply. Prestatyn was a seaside resort in North Wales, with a promising future before it. The gas limits were beyond Prestatyn itself, and consisted of Prestatyn, Dyserth, and Meliden. There was a population of some 2650. The gas undertaking originally started in 1892, in which year the Lord of the Manor (Mr. Pochin) obtained a Provisional Order enabling him to carry on a private gas undertaking. In 1881, a similar Order was obtained in regard to water; but the undertaking was transferred to the Urban District Council in 1901. The case of the promoters now was that the Council found it essential that the gas undertaking should also be under their control. Both the works of the Gas Company, and the management of them, were unsatisfactory. The Company had come to the end of their tether; and it was admitted that, in order to carry on the undertaking, there must be enlargements and extensions. The money necessary for these could be raised on better terms by the Local Authority than by an individual. As Lady M'Laren had parted with the water undertaking, there was less reason for her to object now, as to any estate she still retained there, to parting with the gas undertaking than there was to parting with the water undertaking, because water was more important to the development of the estate. The Local Government Board suggested that Prestatyn was a small authority; but there were many other smaller authorities who successfully owned gas-works. They had had some little difficulty in obtaining information; and when they first asked for an inspection of the works, they were refused. When, ultimately, they were allowed to inspect them, the whole place had had a coat of paint, and had been made to look better than it otherwise would have done. The accounts had never been deposited with the Clerk of the Peace, as was required by the Gas-Works Clauses Act, 1871. Some accounts had now been furnished to the Council; but they were incomplete, and disagreed. Then there had never been any testing apparatus, and they had been unable to test for illuminating power. The maximum daily output was 26,000 cubic feet. The works were sufficient, with the exception of the scrubber, which was only equal to about 10,000 feet, which might account for the amount of ammonia which passed with the gas. Complaints as to the quality of the gas had been received both with regard to private and public lighting. At the ratepayers meeting for the Bill, Lady M'Laren's Manager was present, and even he complained of the shockingly bad light. The quality was bad, the smell offensive, and the gas dirty. It choked the burners with a sort of tarry substance, and they had to be constantly cleaned or renewed. The pressure was bad and irregular, and the light altogether was most unsatisfactory. There had been complaints with regard to the laying of the mains in the streets. The capital expenditure per million cubic feet sold was about £1400; whereas it ought not to exceed £1000. The leakage was about 13 per cent., instead of being about 6 per cent. for a district of this character. The carbonization results were altogether unsatisfactory; the average being 9089 feet per ton. The works were in the hands of an amateur, except so far as he had gained experience from the works. The Council approached Lady M'Laren with a view to purchasing the gas undertaking; but she was not willing to dispose of it. It was necessary to apply for further capital powers; and her ladyship had gone for a Provisional Order.

The CHAIRMAN: And the Provisional Order was referred to us; so that the Committee should consider the Bill.

Mr. WEDDERBURN: Yes; so that practically you have before you two competing Bills in this sense, that you would not pass one if you passed the other.

Mr. FITZGERALD said he appeared on the Provisional Order. He would hardly call the two measures competing Bills. There was no question at all that further capital was required. The only question was whether compulsory powers of purchase should be given to the Council.

The CHAIRMAN: Yes. If the Committee refuse to give the compulsory powers to purchase, I do not think there is any objection to increasing the capital to improve the gas-works.

Mr. WEDDERBURN went on to say that the Provisional Order was made after their Bill was deposited. The further capital was to be £5000, and the borrowing powers £1250. Lady M'Laren had no interest except a financial one; and if the Council bought the undertaking on arbitration terms, it could not be said she was damnified in any way. She ought not to suffer one penny of loss. Under the Order there was provision for a 7 per cent. dividend upon new capital expended and 5 per cent. upon borrowed money. There were no auction clauses; so that the position apparently which was contemplated was that on every £100 raised, Lady M'Laren should be entitled to 7 per cent. No Committee would give a company such a position. Again, if there were no auction clauses, no doubt the money would be raised to return about 4½ per cent. In her ladyship's petition against the Bill, she strongly objected to be obliged to sell the undertaking and to the compulsory purchase of the lands which would interfere with her building schemes.

Mr. *John Hughes*, the Clerk to the Urban District Council, said the gas supplied was dirty, and the fittings got clogged and required frequent cleaning. He had no written complaints; but he had received several verbal complaints that the gas was poor. The agreed purchase price of the water undertaking was £7500. It was not quite paying at the present time.

Mr. *T. J. Scott* said that, as a member of the Council, he had heard complaints that the gas was most unsatisfactory. He thought it would be to the advantage of the town if the works were under the control of the Local Authority. The price of gas in the past 17 years had been reduced by 6d.

Mr. *C. Roberts*, surveyor, said he had had cause to complain of the bad quality of the gas, and also of the insufficient depth at which the mains were laid. The public lighting was bad; and in November, 1907, complaints were pretty general.

Mr. *F. Wilkinson*, the Surveyor to the Urban District Council, said he had had to make complaints in regard to the breaking up of the roads by the Company, and in some cases when a road had recently been repaired.

Mr. *E. H. Stevenson* gave evidence in support of the Bill. He stated

that when he first asked to inspect the works he was refused permission until the Company's Engineer was present. He examined the gas as far as he was able. In the Council's offices he undid one of the burners, and he had never smelt such foul gas. He put a piece of paper against the burner, and he could actually see the gas coming out. On his second visit to the works, the gas was as pleasant smelling as it could be after purification. The retorts were capable of dealing with 55,000 or 60,000 cubic feet per day; the condensers could deal with about 100,000 feet; the purifiers were large enough for the present requirements; but there was only one small scrubber. That the gas had been so foul was clearly the result of carelessness. There were two gasholders. Considering the various features of the works, they were almost larger than the present demand needed. There had been some difficulty in getting the Company's accounts; but those supplied showed the capital to be £6613, which had all been expended. The quantity of gas sold was 4,486,000 cubic feet a year; and the capital expenditure represented £1400 per million cubic feet sold, which he considered a high figure. The quantity of gas made was 5,170,000 feet; the quantity accounted for being 4,521,000 feet. This showed a leakage of 13 per cent.; whereas it ought to have been only 6 per cent. There had been bad management in the carbonizing department. On the works there was no gas-testing apparatus; whereas it was a statutory obligation that there should be. Considering the amount of gas produced per ton of coal, he thought the gas supplied was of 15-candle power; but it was impossible to say definitely in the absence of any testing apparatus. He did not see any reason why the undertaking should not be a profitable one; and the price of gas might be reduced. Something over £400 was the profit made last year; and the output of gas was likely to increase. Where a gas company had been in default in the conduct of their undertaking, so far as he knew Parliament had never refused a local authority power to purchase. In almost every instance where the local authority had control of the gas undertaking, the consumer as well as the local authority had benefited, and the shareholders, as a rule, had been thoroughly satisfied with the amount they had received by arbitration.

Replying to Mr. FITZGERALD, witness said he did not think the price charged for gas was unreasonably high, considering the size of the undertaking.

Re-examined by Mr. WEDDERBURN, witness said that on the water undertaking there had been a deficit of £70 a year; but that was being paid off. In Prestatyn, the price for gas in slot-meters was 5s. per 1000 cubic feet. The price for ordinary lighting was 4s. 6d.; but this was reduced to 4s. if the consumer took gas for cooking as well. There had been no testing apparatus provided on the works. The Council had a remedy for the supply of bad gas; but it had to be proved.

Mr. *J. C. Belton*, the Engineer of the Chester United Gas Company, said he was appointed Gas Examiner to the Prestatyn Urban District Council. When he examined the works, he found there was no testing apparatus, and the purifier had not been changed—the reason apparently being that the works had been left in charge of a stoker. The gas had been insufficiently scrubbed. The make of gas per ton was exceedingly low; while the consumption of coke on the premises was very high indeed. With careful management the result would be different; and he believed that they would produce a better article at a much less cost of production.

Replying to Mr. FITZGERALD, witness said that, with regard to the suggestion that local authority management of gas-works was better than company management, it depended upon the kind of company. He agreed that Sheffield and Plymouth were the best managed undertakings in the country, and they were in the hands of Companies.

Mr. *L. Hall*, the Engineer and Manager of the gas and water undertaking of the Rhyl Urban District Council, said that, on the average of the five years ended Dec. 31, 1908, the quantity of gas produced per ton of coal carbonized was 9060 cubic feet. During the same period the quantity of coke sold per ton of coal carbonized was 4·61 cwt. These figures pointed to very indifferent management. The least quantity of gas produced per ton of coal should have been 10,000 cubic feet, and the least amount of coke sales per ton of coal should have been 9 or 10 cwt. There had been no loss as a result of the purchase of the gas undertaking by the Rhyl Urban District Council. The price of gas had been lowered and the consumption considerably increased. Good profits had resulted during the past six years; the total being £8174. The profit for 1907 was £1813. If the management were as good at Prestatyn as at Rhyl, there would be no fear of a loss.

Mr. *Wm. B. Keen*, chartered accountant, said he had examined the accounts which had been supplied by the Company; but they were not satisfactory or full. They did not even include a balance-sheet, to show the exact financial position of the undertaking.

Mr. *J. Banks*, a member of the Council, said he had had to complain of the quality and pressure of the gas. The illuminating power had frequently been poor, and the gas was very dirty. The taps became stiff as a result of the ammonia in the gas.

Further similar evidence was given—one witness describing the gas as "lurid glare, yellowish red."

This closed the case for the promoters.

Mr. FITZGERALD then called

Sir *Chas. M'Laren*, who gave evidence in support of the case of Lady M'Laren. He said that the people might have been injured if they had tried to make a profit out of the concern, and they had tried to work as economically as possible. When the Council took over the water-works, there was an increase in the rates; and there would be just the same sort of thing again if they acquired the gas undertaking. He was aware that Lady M'Laren was in receipt of a good percentage; but it was only now, after 17 years, that she was getting any benefit. Her ladyship had stood the racket for all the time, and it should not be taken away from her. His interests, and those of Lady M'Laren, were for the good of Prestatyn; and if he thought that the sale of the gas-works would be to the benefit of the place, he would do it.

Mr. *H. D. M'Laren*, M.P., gave further evidence of a similar nature. He said that if her ladyship obtained the Provisional Order the works would be brought entirely up to date.

Mr. *William Cash*, chartered accountant, said he had examined the estate books of Lady M'Laren with regard to the gas undertaking. For the past year the profits amounted to £445. In this, as was the case in undertakings carried on by a single individual, there had been no formation of share capital. The money had been found in the first instance by Mr. Pochin, and afterwards by Lady M'Laren. The quantity of gas made had largely increased between 1904 and 1908; and the consumers had increased in five years from 120 to 159. If this increase were continued, the undertaking would become a very profitable one. Under the Provisional Order, it was proposed to take an additional £5000 of share capital and £1250 borrowing powers, thereby doubling the existing capital and borrowing powers. With the increased capital the undertaking could be carried on for about ten years. In a business growing as this was, there would undoubtedly be some claim for prospective profit, and so on. He thought it was unfair, in a sense, that the proprietor who had borne the burden of the undertaking from the start should be deprived of the business at a time when it was becoming a paying concern. He did not see that there would be any material advantage to the consumer if the undertaking were transferred to the Council.

Replying to Mr. WEDDERBURN, witness said that the gas accounts were kept with the estate accounts in separate columns; but it would not be right to say that the absence of statutory accounts constituted a disadvantage to the consumer. He agreed that the accounts now supplied to the Committee differed from those which were supplied to the promoters. An undertaking of this kind was under the ordinary statutory regulations in regard to gas; but being a private concern, they were not under the same regulations as limited liability companies or even statutory companies. They were under the same liability to the public.

Mr. *Henry Woodall* (Messrs. Corbet Woodall and Son) said that, having regard to the quality of coal used at the works, the illuminating power of the gas produced would probably be between 17 and 18 candles. The complaints which had been referred to did not arise from the quality of the gas manufactured. If they had a rich gas of this kind, carbon might be deposited on mantles, on account of the air adjustment being badly arranged. If the mantles were properly arranged, there would be no blackening of them. With regard to the burners being in bad condition, it was probably due to the fact that, Prestatyn being a holiday resort, the people might use the burners for three months of the year, and for the other nine months they were not lighted. The staff employed was sufficient and capable of doing the work. The results obtained were quite good; and there was really no justification for the statement that the works were in a bad condition. The price charged for gas was a reasonable one for works of this size, and was lower than the price charged by any company of a similar nature within a radius of 20 miles.

Mr. FITZGERALD agreed that the installation of testing apparatus was a statutory obligation; and he was authorized to state that such apparatus would be provided.

Replying to Mr. WEDDERBURN, witness said he thought default was a good reason for transfer.

Mr. *James B. Linnell*, J.P. (a member of the Urban District Council and Agent to Lady M'Laren), said that when he had complaint made to him of the unsatisfactory light, it was found that the burners were in a dirty condition. After they had been cleaned, the light was greatly improved. He suggested that the reason why so many members of the District Council supported the case was their desire to pay a visit to London.

Mr. FITZGERALD, in addressing the Committee, said there had been a sort of suggestion running through the whole of Mr. Wedderburn's speech that there was some sort of parliamentary principle or practice that if a local authority wanted a gas underktaking it was entitled to take it, as if the onus was thrown upon the undertakers to show some reason why the concern should not be transferred. There had been a number of transfers of gas undertakings to local authorities; but in the great majority of cases the transfers had been made by consent. Where compulsory transfers had taken place, they had generally been non-statutory companies; and in the comparatively few instances where statutory undertakings had been compulsorily transferred, it had invariably been in special cases. With regard to the complaints that had been referred to, he pointed out that, unless flat-flame burners were carefully looked after, a bad light would probably result. With regard to the absence of a testing-station, he agreed that the terms of the Act had not been complied with; but the Local Authority were in a position to demand the appointment of a gas examiner, and the consumers also could have one appointed. But an examiner had not been asked for at all. The undertaking compared favourably with any company in the adjoining counties; and this was a sufficient answer to all the complaints that had been made. Lady M'Laren had taken nothing out of the concern. She had provided money whenever it was wanted; and her endeavour had been to keep the expenditure low, so as to enable the gas to be sold cheaply. He admitted that the accounts had not been supplied in accordance with the Act of 1871; but the matter had been overlooked, and in the future it would have proper attention.

Mr. WEDDERBURN, replying on behalf of the promoters, held that where a gas company were in default or had come to the end of their tether, there was sufficient ground for the transfer being made to the local authority. The transfer was asked for by the people of Prestatyn; and they knew very well, remembering the Water Bill, what the expenditure would be. The costs of the Water Bill had been paid off; and now the ratepayers were willing that the gas undertaking should be in the hands of the Council.

After a private discussion,

The Committee decided that the Urban District Council were to be granted the compulsory powers to purchase; but with regard to the preamble of the Bill, they considered that the words "whereas the works are in a bad condition" should not appear.

Mr. FITZGERALD asked that the Provisional Order promoted by Lady M'Laren should be allowed to proceed pending the final decision on the Prestatyn Bill; so that if the gas portion of the Bill were rejected in the other House, there would be someone left in a position to give the gas supply and carry on the undertaking.

The CHAIRMAN said he did not see how the Committee could authorize two authorities to do the same thing.

Mr. WEDDERBURN said there was no precedent for such a procedure;

and if what Mr. Fitzgerald asked were done, it would encourage opposition elsewhere.

The CHAIRMAN said the Committee had no course open to them but to declare the preamble of the Provisional Order not proved.

Other portions of the Bill will be proceeded with to-day.

BLACKWOOD GAS BILL.

This Bill, for incorporating and conferring further powers upon the Blackwood Gas Company and for other purposes, came before the Unopposed Bills Committee of the House of Commons on Thursday last—Mr. EMMOTT, Chairman of Ways and Means, presiding.

Mr. LEES (Messrs. Lees and Co., Parliamentary Agents for the promoters) stated that the Bill was to incorporate as a statutory concern a Company that had been carrying on business under the Joint-Stock Acts since 1890. It was registered in that year to supply gas to two urban districts in the county of Monmouth. In 1891, there was a proposal to give statutory powers to another company to supply an area, including the Blackwood district. The present promoters opposed, with the result that a clause was inserted protecting the area to them. The issued capital raised at present was £7200. The Company paid a dividend of 3 per cent. each year up to 1901, afterwards 4 and 4½ per cent., and last year 5 per cent. The present measure asked for a total capital of £30,000, of which £22,500 was additional capital to be raised under the Bill. In reply to the Chairman, he added that the present charge for gas was 5s. per 1000 cubic feet within a mile of the works, and 5s. 6d. beyond. The Company could not increase the price; but they believed that with the existing population of the district they would be able to reduce it.

The Surveyor to the Company gave evidence, in the course of which he said that the production of gas was 5 million cubic feet, and with the new works it was estimated that in twelve years it would be 40 millions.

The CHAIRMAN inquired what the shares of the Company had changed hands at recently?

Mr. LEES: At par.

The Committee passed the preamble.

LEGAL INTELLIGENCE.

Action against the New Toddington Gas Company.

One of the cases set down to come before Mr. Justice Hamilton in the King's Bench Division of the High Court of Justice last Tuesday was that of *Savage v. New Toddington Gas, &c., Company and Others*. On it being called, however, Mr. Gore-Browne, K.C., who appeared with Mr. Thorpe for the plaintiff, said his Lordship would not be troubled with the action, as he had been able to come to terms with his friends, who represented the defendants, Mr. Atkin, K.C., and Mr. Poyser. It would not be necessary to state the facts; but, by consent, there would be judgment for the plaintiff for £450, with interest at 4½ per cent. from June 24, 1908—the judgment not to be acted upon if certain moneys were paid within 30 days. The substance of the claim was with regard to the omission of matters which by Statute ought to have been included in the prospectus. The statement, however, also contained a charge of knowingly making misleading misrepresentations; and this charge had been withdrawn. His Lordship gave judgment in conformity with the terms agreed upon.

The Case of Alleged Trespass at Ventnor.

In the "JOURNAL" for the 9th of February last (p. 392), we reported the proceedings in an action in which a Mr. Cato and his wife claimed damages from the Ventnor Gas and Water Company and their Solicitor (Mr. A. W. Drew) for alleged trespass. The dispute arose originally over the balance of an account; and in the result a writ was issued. Owing, however, to Mr. Cato's absence, it could not be served; and Mr. Drew obtained an order for substituted service. At last the sheriff's officer took possession, and remained for seven weeks. This was the alleged trespass. Interpleader and other legal proceedings ensued; and eventually the case came before Mr. Justice Ridley and a Special Jury. The outcome was that his Lordship held that no cause of action had been shown; and he directed the Jury to give a verdict for the defendants. This was done; and the case was dismissed, with costs. Against this decision the plaintiffs appealed; and the matter came before Lords Justices Fletcher Moulton and Buckley and the President of the Probate and Admiralty Division (Sir John Bigham) last Tuesday. Mr. Norman Craig, K.C., submitted that the learned Judge was wrong in entering judgment for the defendants without allowing evidence to be given for plaintiffs, and he contended, on the authority of the Court of Appeal, that this was good ground for a new trial. Mr. Powell, K.C., who represented the defendants, opposed the extension of the litigation which had already taken place over this dispute by having a new trial. Sir John Bigham, however, thought Counsel would be well advised to consent to this course, as it would afford the learned Judge in the Court below an opportunity of ascertaining what questions should go to the Jury. In the result, an order was made for a new trial; the costs of the appeal to be borne by the defendants, on the ground that they had resisted the plaintiffs' application.

Price of Gas Reduced at Droitwich.—The Droitwich Gas Committee have resolved to reduce the price of gas by 2d. per 1000 cubic feet, as from Sept. 30 next. The annual report of the working showed that a debit balance of £42 had been converted into a credit of £371.

MISCELLANEOUS NEWS.

GAS SECTION OF THE FRANCO-BRITISH EXHIBITION.

Report of the Committee.

The following report of the Committee for the Gas Section of the Franco-British Exhibition, signed, on their behalf, by the Chairman (Mr. H. E. Jones), has just been issued.

FRANCO-BRITISH EXHIBITION, 1908—GAS ENGINEERING SECTION.

The Committee of the above section have pleasure in presenting herewith a copy of the statement of receipts and expenditure in connection with the above Exhibition, together with a short report giving a few particulars with regard to the same.

When the Committee was first formed, it was recognized that there would be a difficulty in getting manufacturers of apparatus and plant dealing with the gas industry generally to co-operate with them, principally on account of the short time that had elapsed since the International Gas Exhibition held at Earl's Court in 1904. They therefore decided to devote their energies to the provision of such an exhibit as would give to visitors an opportunity of seeing for themselves the many ways in which gas can be economically and efficiently used for lighting, cooking, heating, and other industrial and domestic purposes. They wish, however, to recognize the action of those firms which took space in the section, and by their efforts added so much to its attractions.

In furtherance of their object, the Committee arranged with the well-known firm of Messrs. John Barker and Co., Limited, of Kensington, to erect and furnish a complete suite of rooms, including drawing-room, dining-room, billiard-room, boudoir, study and library, bedrooms, bath-room, nursery, kitchen, scullery, and laundry, which were lighted and heated throughout by the most modern gas appliances, and in which gas was shown in use for cooking, laundry, and other purposes. Practical demonstrations in these departments were given daily, and were extremely well attended. The London meter-makers also arranged a stand at which skilled workmen gave demonstrations of the processes involved in the manufacture of gas-meters; while the Gaslight and Coke Company provided a very attractive display of the many beautiful and useful products obtained from the residuals produced in the manufacture of coal gas, and in addition gave daily demonstrations of the manufacture of incandescent mantles.

The Committee were fortunate enough to secure the order for the lighting of a considerable portion of the grounds. The principal area was entrusted to Messrs. James Keith and Blackman Company, Limited, who very effectively lighted a large number of the principal thoroughfares and avenues by means of over 230 of their high-pressure lamps, each giving an average illuminating power of 1500 candles. The compressing plant which was used in connection with the installation was situated on the Committee's stand, where it attracted considerable attention. A further portion of the ground was entrusted to Messrs. Moffat's Limited, who made use of their Lucas thermopile lamps. It was generally conceded that the parts of the grounds lighted by gas were brilliantly and evenly illuminated, and compared very favourably with the areas in which electricity was used. The lighting of the Indian Pavilion was also entrusted to the Committee; the work of fitting, &c., being very effectively carried out by the Gaslight and Coke Company. Gas was also extensively used in many other parts of the grounds and buildings, as may be gathered from the fact that during the progress of the exhibition the total quantity of gas consumed amounted to about 48 million cubic feet, of which nearly 2 million cubic feet were used in the Committee's exhibit.

In order to obtain a sufficient sum to enable the Committee to carry out their scheme, circulars asking for contributions were issued to all gas companies in the United Kingdom above a certain size. The response to their appeal was barely adequate as a whole; but the Committee gratefully acknowledge the public spirit of the 148 gas undertakings which subscribed to the fund, and thereby placed the Committee in possession of a total sum of £4057 3s.

It may be mentioned that the exhibit was described in the official catalogue as an "Exhibit arranged by the Gas Undertakings of the United Kingdom," which was the inscription that appeared over the exhibit itself. The Committee have reason to believe that as a popular and attractive advertisement the exhibit completely fulfilled its purpose, and met with general approval from the thousands who inspected it. That the beneficial results have not been confined to the neighbourhood of London is proved by the fact that over 3500 definite inquiries from visitors were received at the stand, which were transmitted by letter to 367 different gas companies situated all over the kingdom—figures which would have been greatly exceeded if sufficient funds had been available to allow of the employment of a larger number of assistants. In this connection the Committee desire to tender their best thanks to those gas companies which at their own cost rendered valuable assistance by sending officials to act as attendants.

The Committee have pleasure in stating that the exhibit was awarded two diplomas for grand prize by the International Jury.

After the close of the exhibition, the stand was allowed to remain, in the hope that it might prove of some further use. But the authorities responsible for the exhibition being held at Shepherd's Bush during the present year required the Committee to demolish it; and the cost of doing so has more than exhausted the small balance shown on the statement of accounts as standing to the credit of the fund.

The Committee feel they cannot conclude this short report without recognizing the great assistance rendered by the Gaslight and Coke Company, and the Brentford Gas Company, and by those of their officers who took part in the arrangements. They wish also to offer their best thanks to Mr. D. Milne Watson, the Vice-Chairman of the Committee, to Mr. James William Helps, the Honorary Secretary, and to the members of the Sub-Committee, for the important share they took in organizing and carrying out the scheme.

Accompanying the report are the names of the Committee and of the

gas undertakings which subscribed to the fund, and also the statement of accounts, as examined and certified by Mr. William Cash, F.C.A.

Gas Engineering Committee.

H. E. JONES, London, *Chairman.*

D. MILNE WATSON, London, *Vice-Chairman.*

A. COZE, Reims.
E. ALLEN, Liverpool.
J. F. BELL, Derby.
T. BERRIDGE, Leamington Spa.
A. E. BROADBERRY, Tottenham.
W. F. COTTON, Dublin.
T. GOULDEN, London.
T. GLOVER, Norwich.
W. DOIG GIBB, Newcastle.
F. W. GOODENOUGH, London.
C. HUNT, London.
D. H. HELPS, Reading.
W. R. HERRING, Edinburgh.
A. A. JOHNSTON, Brentford.
S. H. JONES, London.
F. D. MARSHALL, London.
J. G. NEWBIGGING, Manchester.
HANBURY THOMAS, Sheffield.
S. Y. SHOUBRIDGE, Sydenham.
W. H. Y. WEBBER, London.
A. WILSON, Glasgow.
H. WOODALL, London.
H. W. WOODALL, Bournemouth.

J. W. HELPS, Croydon, *Hon. Secretary.*

Gas Undertakings Subscribing to Joint Fund.

Aldershot. Ascot. Ashton.
Bagnalstown. Barking. Barnet. Barrow-in-Furness. Bath. Birmingham. Bishop Auckland. Bognor. Boston. Bournemouth. Birkenhead. Brentford. Brighton. British. Burton-on-Trent.
Cambridge. Canterbury. Carrick-on-Suir. Cheltenham. Chertsey. Chester. Chigwell, Loughton, and Woodford. Commercial. Compagnie l'Union des Gaz. Croydon.
Dartford. Derby. Devonport. Douglas (I.M.). Dublin. Durham.
Eastbourne. Elland. Enfield. European. Exeter. Exmouth.
Felixstowe. Fermoy. Frodsham. Frome.
Gaslight and Coke Company. Glasgow Corporation. Gosport. Guernsey. Guildford.
Hampton Court. Harrow and Stanmore. Hastings. Herne Bay. Hertford. Hexham. High Wycombe. Hitchin. Hornsey. Horley.
Ilford. Imperial Continental Gas Association. Ipswich. Jersey.
Kidderminster. Kilkenny. Kingston-on-Thames.
Leamington Priors. Leicester Corporation. Leighton Buzzard. Liverpool Corporation. Longford. Lowestoft. Louth. Luton.
Magherafelt. Maidstone. Mallow. Manchester. Matlock. Mountmellick.
Newmarket. Newport (I.W.). Northampton. North Middlesex.
Oldham Corporation.
Pelton. Peterborough. Prescot. Preston. Queenstown.
Radcliffe. Reading. Redditch. Redhill. Richmond. Rochdale. Rochester. Romford. Ross. Rushden. Rugby. Runcorn.
Salford Corporation. Sandown. Scarborough. Shanklin. Sheffield. Sleaford. Southampton. Southend. South Metropolitan. South Shields. South Suburban. Spennymoor and Tudhoe. Stafford. St. Albans. Stockton-on-Tees. Stockport. Stourbridge. Stretford. Sunderland. Sutton.
Taunton. Thurles. Tipperary. Tottenham. Tunbridge Wells. Tynemouth. Uxbridge.
Wakefield. Waltham Cross. Wandsworth. Warrington. Warwick. Waterford. Watford. Wellingborough. Wellington (Salop). West Ham. Weston-super-Mare. Wicklow. Widnes. Winchester. Wolverhampton. Worthing. Wrexham.
Yeovil. York.

Statement of Accounts.

RECEIPTS.

Contributions from 148 gas undertakings.		£4057 3 0
Rebate on price charged for gas, *per contra*—		
Gaslight and Coke Company	£51 17 5	
Brentford Gas Company	51 17 5	
		103 14 10
Contributions to cost of leaflets . . .		46 0 0
Repayment of charges (*per contra*) Franco-British Exhibition—		
Lighting in grounds	£102 0 0	
Telephone (one moiety)	8 10 0	
Gas supplied	9 12 5	
		120 2 5
		£4327 0 3

PAYMENTS.

Expenditure on exhibit—		
Franco-British Exhibition for space .	£950 0 0	
Erection and furnishing	1906 15 7	
Fitting-up stand	152 16 9	
Maintenance and materials, including wages	373 9 9	
Electrical work for gas-engine for laundry exhibit	47 17 10	
Gas, water, and drainage connections .	31 7 5	
		£3462 7 4
Expenditure during exhibition—		
Gas and water	£291 0 8	
Notice in official catalogue	7 7 0	
Salary of Superintendent	100 0 0	
Telephone	17 0 0	
Insurance	7 5 0	
Showcards, photographs, &c. . . .	43 9 2	
Attendants' wages	27 9 6	
		493 11 4
Self-intensifying lighting in grounds (repaid *per contra*)		102 0 0
Cookery demonstrations—		
Superintendent's fees	£86 16 0	
Materials and utensils	35 4 10	
		122 0 10
Stationery and leaflets		51 17 7
Clerical labour, postage, travelling, and petties		89 2 11
		£4321 0 0
Balance in hand available for printing and postage, balance-sheet, &c.		6 0 3
		£4327 0 3

MANCHESTER'S DEPLETED GAS RESERVE FUND.

No Further Concession to Automatic Meter Users at Present.

The minutes of the Manchester Gas Committee presented for confirmation at the Council meeting last Wednesday contained a paragraph to the effect that to reduce the price of gas to slot-meter consumers, as suggested by Mr. Jennison, would mean so serious a loss of revenue to the department that the proposal could not be entertained at present.

Alderman Gibson, in moving the confirmation of the Committee's proceedings, said they had been passing through a very trying time. Not only had the Committee agreed to continue the payment of £50,000 in relief of the rates, but they had had to pay practically £50,000 more for coal. Despite the heavy calls made on the department, they had contrived so far to avoid raising the price of gas, as had been the case with some other undertakings. He added that their reserve fund had been depleted; but he looked forward to a better state of things. Meanwhile, it was impossible to accede to the request to place automatic meter consumers on the same terms as those with ordinary meters.

Mr. Jennison, who expressed in no measured terms his dissatisfaction at the Committee's decision, moved that the minute referring to penny-in-the-slot meter users be referred back for further consideration and the presentation to the Council of a fuller report. Some 60,000 ratepayers, he said, were affected; and there was an impression abroad that the consumers of gas by automatic meters were charged more because the collection of their contributions cost more.

In seconding, Mr. Fox said no doubt Alderman Gibson, as Chairman of the Gas Committee, knew all about the subject; but other members of the Council were not in the same fortunate position. Replying to the remarks made, Alderman Gibson contended that they might as well expect a small grocer, who had to measure his tea 32 times to the pound, to sell it at the same price as the man who sold half-pounds or pounds at a time. They had some 50,000 automatic meters in use, and each had to be examined once a month—the total sum collected each month being about £5000. He reminded the Council that, not only was there the cost of collection, but many of the meters were robbed of their contents and spoiled; and altogether the department was put to considerable expense with these automatic meters. He desired also to point out that within the last ten years concessions had been made to penny-in-the-slot consumers representing £100,000. Was it the wish of the Council, he asked, that these concessions should be withdrawn? They had not been made in a philanthropic spirit, it was true, but so that the people would burn more gas. Since he took up the chairmanship of the Gas Committee, concessions representing £1,500,000 had been made to the consumers; and whereas at the beginning of the period they had £175 worth of assets for every £100 of liabilities, they had to-day £225 of assets for every £100 of liabilities. After what he had said, he asked the Council to support the Committee in their decision. The minutes of the Committeee were then confirmed by an overwhelming majority.

BURY CORPORATION GAS-WORKS RESULTS.

The report to his Committee of Mr. H. Simmonds, the Engineer and Manager of the Bury Corporation Gas-Works, on the past year's working, states that the total quantity of gas made was 427,820,400 cubic feet; while that unaccounted for was equal to 5·2 per cent. The following is the working statement:—

	s.	d.
Cost of manufacture, distribution, &c., per 1000 cubic feet of gas sold.	2	4·17
Less tar, sulphate, coke, and sundries	0	11¼·13
Net cost of gas	1	4⅞·04
Add interest on loans, stock, and sinking fund . . .	0	7½·32
Total cost of gas	2	0¼·36
Income from gas, hire of meters, cookers, and boilers .	2	3¾·22
Profit (£5689)	0	3¼·86

At March 31, there were 2448 public lamps in use, 2324 cookers, 6176 grillers, 5097 hired ordinary meters, 3568 prepayment meters, and 111 gas-engines.

The Gas Committee resolved that the sum of £2860, one moiety of the profit for the year, be carried to the credit of the general rate, and a similar sum to the credit of the gas consumers; and that the price of gas for the ensuing twelve months be as follows: To consumers within the borough (except the added areas), 2s. 3d. per 1000 cubic feet; to consumers within the added areas and outside the limits of the borough, 3s. per 1000 cubic feet; and that for motive power and manufacturing purposes the price be: For consumers in the borough (excepting added areas) using less than 100,000 cubic feet a quarter, 2s. 1d. per 1000 cubic feet; exceeding 100,000 cubic feet, but not exceeding 500,000 cubic feet, 1s. 11d.; exceeding 500,000 cubic feet, 1s. 9d. For consumers in the added areas using less than 100,000 cubic feet, 2s. 10d.; exceeding 100,000 cubic feet, but not exceeding 500,000 cubic feet, 2s. 8d.; exceeding 500,000 cubic feet, 2s. 6d.—the whole of these prices to be subject to a discount of 1d. per 1000 cubic feet of gas consumed for prompt payment, and a reduction of 2d. per 1000 cubic feet allowed from the amount now standing to the credit of the gas consumers. Also that for the sum of 1d. consumers using prepayment meters be allowed 32 cubic feet of gas.

In moving the adoption by the Town Council of the minutes of the Gas Committee, Alderman Fletcher said they had a very successful undertaking in the gas-works. Ten years ago, the make of gas was 340 million cubic feet, and last year it was 427 millions; and, further, the works had been very greatly improved during these years. For the past year there was certainly some £200 or £300 profit less than

was estimated; but they must remember that the cottages had been repaired, and some £200 had been spent on them. If they took this item into account, they would see that the estimates had just about been realized.

The minutes were adopted.

COVENTRY GAS-WORKS REPORT.

The annual report of the Gas Committee of the Coventry City Council states that the total borrowing powers exercised since the acquisition of the undertaking amount, with nominal additions, to £449,316, of which £31,340 has been repaid out of the sinking fund, leaving the present liabilities at £417,976. Against this, the Corporation have reserve and sinking funds invested amounting to £55,839, leaving a balance of liability of £362,137. The amounts expended during the year on capital account have been as follows: Structural works (Foleshill), £47,437; new mains and service pipes, £3798; new meters, £1635—total, £52,870. The total capital expenditure since the acquisition of the undertaking, including the original purchase money, has been £454,823; and as the borrowing powers exercised amount to £449,316, there is at present a balance overdrawn of £5507. The total revenue for the year from all sources, including sales of gas, coke, tar, &c., came to £124,688. The expenditure for coal and all other materials, wages, repair and maintenance of works, &c., was £101,372. This leaves a gross profit of £23,316, to which has to be added the amount brought forward from last year, £953, making a total of £24,269. Against this are capital and other charges amounting to £21,020; so that the final balance of profit for the year is £3249, which the Committee think, considering the state of trade during the year, may be regarded as very satisfactory. The amount of the reserve fund at the present time is £10,157.

The Committee recommend that the balance of profit of £3249 be dealt with as follows: That £2000 be paid over to the district fund in relief of the rates, and that the balance of £1249 be carried forward to the next account. Last year the net profit on the undertaking amounted to £9953; and the reduction this year is mainly ascribed to the dulness of trade in Coventry.

OLDBURY GAS PROFITS.

The annual statement of accounts of the Oldbury gas undertaking, which has just been issued by the General Manager (Mr. A. Cooke), shows a net profit for the year ending March 31 of £672. The amount of loans outstanding on March 31 was £56,440; and during the year £959 11s. 3d. was spent on new meters, mains, &c. The cost of the manufacture of gas was £11,360, of distribution £1205, of public lamps £889, of rent, rates, and taxes £1188, and of management £399. The receipts from sales of gas amounted to £14,712 (including £3098 from prepayment meters); residual products realized £4268; and gas-fittings, £260. The gross profit was £4264.

The quantity of gas manufactured was 130,780,000 cubic feet, of which 6,480,000 feet, or 4·95 per cent., was unaccounted for. The make included 5,336,000 cubic feet of carburetted water gas. In the manufacture of the 125,444,000 cubic feet of coal gas, 10,275 tons of coal were used, which gave a make per ton of 12,202 cubic feet.

The report was discussed at a meeting of the Urban District Council last week, when the Chairman (Mr. C. Thomlinson) observed that, considering the fact that during the year they had reduced the price of gas 2d. per 1000 cubic feet, and that trade had been bad, the report was a satisfactory one. The amount received for gas showed a decrease of £728, which was partly accounted for by the reduction in price, and partly by 2,608,900 cubic feet less having been sold, owing to the state of trade. The decrease in the sale of gas amounted to 1·33 per cent. Mr. Wilson, in seconding the adoption of the report, said they were fully satisfied with the able, conscientious, and loyal way in which Mr. Cooke managed the gas undertaking. The report was adopted.

DECREASED CONSUMPTION AT LOUGHBOROUGH.

The annual statement of accounts of the Loughborough Corporation Gas Department, which were submitted at the last monthly meeting of the Town Council, showed on the capital account a total expenditure of £126,394—an increase during the year of £473. The revenue account exhibited a total income of £20,317, as compared with £22,133 in 1908—leaving a balance, after meeting £14,551 expenditure, of £5766. The manufacture of gas cost £11,510, as compared with £12,676 last year, with a corresponding reduction in the consumption. The profit and loss account showed a deficiency of £286. About 9563 tons of coal were carbonized, and 42,174 gallons of oil. The residual products sold realized £7526.

In moving the adoption, Alderman Bumpus said that, in consequence of the decreased consumption of gas, mainly on account of the depression in trade in the town, but partly owing to the competition of electricity, the financial result was not so satisfactory as in previous years. This was borne out by the balance on the revenue account carried forward, of £5766, which was in round figures £300 less than the year before. It was anticipated the profit would have been considerably larger. There had been 10 per cent. diminution in the output of gas; while a large part of their costs were fixed charges, and could not be reduced at all. They had endeavoured to maintain economy all round. The unexpected extent to which the profit had been reduced had had the effect of placing the profit and loss account £286 to the bad, which was unanticipated at the commencement of the financial year. If they had anything like a normal state of trade in the town, there was ample evidence to show that they might expect during the current year a decidedly better financial result than was achieved in the financial year just closed.

CALDICOT AND ITS GAS SUPPLY.

On March 17 new gas-works were opened at Caldicot, near Newport, Mon., and though the whole of the works are not yet completed, a supply of gas to the district is already being given.

About three years ago, Mr. Rust, the late Manager of the Chepstow Gas-Works, who was then residing at Caldicot, felt convinced that there was an opening for a gas-works in the district. He first consulted Mr. Thomas Canning, the Engineer of the Newport (Mon.) Gas Company, who made a report upon the prospects of the district, and the possibilities of a good future. After seeing the report, several gentlemen came forward; and a Company was formed with Messrs. George Winstanley, J. L. Cloudsley, and John Griffiths as Directors.

On canvassing the district, over 200 of the inhabitants promised to become consumers. There was also a prospect of the district opening out considerably, as the Great Western Railway Company were erecting large engine-sheds at the Severn Tunnel Junction. This prospect has been fulfilled; many new houses have been built, and more are in course of erection.

The Company applied for a Provisional Order, which was granted, and their capital of £6000 was later increased by the Board of Trade to £7500 at 10 per cent., and a further £2500 borrowing powers.

Nearly the whole of the works have been completed and mains laid to most of the districts the Company have power to supply. Quite model works have been built to the designs of Mr. Canning. Everything is up-to-date and prepared for an expected increase. The buildings and work are of the best quality, and of good appearance—reflecting great credit upon all concerned. The Company have fitted up nearly 300 houses with slot installations, and there is a fair number of private consumers.

The people in the district are already finding out the advantages of gas, and consumers are being added daily. With the great possibility that the Great Western Railway Company will adopt gas next winter and the starting of a large tin-works, the prospect of the Company is very bright; and with the exertions of the Manager (Mr. Rust), supported by the Consulting Engineer and the Directors, the concern should go ahead rapidly.

A successful gas exhibition has just been held by Messrs. Parkinson and W. & B. Cowan; and this has already greatly increased the demand for gas.

INCREASED OUTPUT AT STAFFORD.

The annual report of the Gas and Electricity Committee which was adopted at the last monthly meeting of the Stafford Town Council showed that nearly 204 million cubic feet of gas were delivered from the works during the past financial year; being an increase of 6½ millions over the previous year. The leakage was 1·29 per cent. The sale of gas yielded £25,611; and the total revenue from all sources was £33,563. The total expenditure was £18,000, and the gross profit was £14,754, which was a decrease compared with the previous year of £1171. The net profit, after meeting capital charges, was £5660; and this has been disposed of by transferring £3000 to the district rate account, £1000 to the credit of the suspense account in payment for the purchase of the water-gas plant, and £1000 added to the reserve fund. Out of the balance, £393 has been ordered to be distributed among the workmen under the profit-sharing scheme; and the balance is carried forward. The income of the electric lighting works was £4400; and the working expenditure was £2000. The balance, representing the gross profits, was transferred to the net revenue account to meet the capital and other charges.

Alderman Wright, commenting on the report, mentioned that, since they took over the gas-works in 1878, they had paid off loans to the amount of £71,220, and paid towards the reduction of the rates £51,675—a total of £122,897. In addition, they had paid large sums to keep the works up-to-date. It was estimated that the works would sell for £375,000. They had in hand a stock of coal valued at £8900; and all they owed on loans was £42,661, and to the bank £8557. So that, when these were paid off, they would have the works clear. They had a capital value of £339,000 over and above their liabilities, which was a large sum in excess of the total liabilities of the Corporation of Stafford; and thus their works were a very valuable asset.

Carlisle Corporation Gas Accounts.

With further reference to the gas accounts of the Carlisle Corporation for the year ending March 31, to which allusion was made in the "JOURNAL" last week, we learn from the Engineer and Manager (Mr. W. J. Smith) that they include the following items of expenditure: £150 for a new 18-inch trunk main, £1250 for steel lining to a gasholder tank, £586 for the conversion of public lamps from the flat-flame to the incandescent system, reduction in the price of gas charged to prepayment consumers amounting to £659, and £250 increase in wages. There was a reduced consumption of gas amounting to 1,521,900 cubic feet; less gas was used in the works and offices, and less was unaccounted for. There was more coke saleable, and more sulphate of ammonia produced per ton of coal carbonized; but £700 less was received for residuals, and gas oil showed an increased cost of £509. The increase in sales amounted to £159. After paying £1000 off the cost of the carburetted water-gas plant, there remains £463 for the relief of the rates, compared with £3634 available for this purpose for the year 1907-8.

Hindley Gas Undertaking.—In his report to the Gas Committee of the Hindley Urban District Council, the Engineer (Mr. H. O. Timmins) stated that the gross profits on the year's working were £3874, and the net profit £186; while the averages for the last seven years were: Gross profit, £3827, and net profit £813. The gross profit for the year represented 4·52 per cent. interest on the capital invested.

GAS SUPPLY IN ROME.

According to the report of the Anglo-Romano Gas Company for the year ended Dec. 31, 1908, some extracts from which were given in a recent number of "L'Elettricita," the quantity of gas sold was about 790½ million cubic feet, of which 160½ millions were supplied to the Municipality and 630 millions to private consumers. There was a decrease of rather more than 2 million cubic feet in the municipal consumption, but an increase of about 15½ millions in that of private establishments; making the total increase 13½ millions, compared with the year 1907. The falling off in the consumption of gas for public lighting is attributed solely to the extended use of the Auer incandescent burner. On the other hand, there was a greater quantity of gas consumed for lighting, heating, and cooking purposes, stimulated, possibly, by a reduction made in the price charged. The prices paid for coal enabled the Company to avert a fuel crisis; and the exceptionally low rates of freight prevailing would have brought down the total cost of the raw material had it not been for the high price of labour. On Dec. 31 last there were in Rome 9701 public lamps, of which 9283 were in use. The number of meters then in operation was 28,139, representing 187,375 burners; being 1201 meters and 6000 burners more than at the close of 1907. It is now customary, however, to reckon for each meter a much greater number of burners than that indicated by its nominal capacity, owing to the use of the incandescent mantle; so that the actual number of burners may be put at fully 50 per cent. more than that arrived at on the basis of the marked capacity of the meters. At the close of last year, there were at work 187 gas-engines, representing about 875 H.P.; being 11 engines less than before, owing to the growing tendency to employ electric power. The length of the mains is now close upon 300,000 yards—an increase of 5800 yards in the period covered by the report.

TAUNTON AND THE ELECTRIC LIGHT.

The Financial Position.

At the Monthly Meeting of the Taunton Town Council last Tuesday—the Mayor (Alderman J. G. Price) presiding—a somewhat animated discussion took place on the presentation by the Electric Light Committee of a revised list of charges to private consumers. The Committee recommended the Council to abandon the present complicated system of charge by "demand indicators" and to adopt a scale of charges for lighting ranging from 6d. down to 3d. per unit, according to consumption. They suggested that consumers who are supplied from the free-wiring installations should be charged 6d. per unit for the summer quarters, and 5d. per unit for the winter quarters. In cases where arc lamps are used for outside lighting (provided the consumption for inside lighting of the premises is not less than 50 units per quarter), the charge to be 2d. per unit for all current used through such arc lamps. If more than one meter is required for any supply, such meter-rents to be subject to a reduction of 20 per cent. off the ordinary charge in respect to each meter.

Dr. Macdonald, the Chairman of the Committee, in moving the adoption of the report, said that the Committee had taken a good deal of trouble to get a reasonable basis of charge for the consumers, and that presented was the best they could put before the Council.

The motion having been seconded, Mr. Van Trump said he was surprised at the report of the Committee, especially as only a few months ago the Chairman said the electric light concern was doing so well that they could reduce the charge for current to the Tramway Company, who, as a matter of fact, were now being supplied at a loss, and would be in future supplied at a greater loss. Then, without being asked to reconsider the charges, the Committee came to the Council and raised the price 2d. per unit. These increased charges would mean that consumers would have to pay £2000 for what they had been receiving for £1200 last year. He considered it a disgrace to the Committee and to the town to say that they had been running the concern on a profit, and in previous years had shown a profit, while now the Committee, to make the concern a financial success, had to propose an increased charge of £600 or £700 a year on the ratepayers. This was a matter that ought to receive further consideration; and, if necessary, the consumers and ratepayers should be consulted. It was apparent to anyone that the electric light had not been paying as a trading concern for the last two or three years. He moved that the whole re-arrangement of charges be adjourned for further consideration.

Mr. Spiller seconded, and said that if the Committee wanted to charge these new rates for current they would soon find there would be a great deal less used in the town.

The vote for the adjournment of the discussion was ultimately lost by a large majority—only five voting in favour of this proposal.

Mr. Penny, continuing the discussion, said the Committee had got as near as they could to a fair price. The large customers were the best; and they ought to have current at a less price than those who burnt a smaller amount. With regard to the trams, they had a very valuable day-load. If it were not for the trams, they would have to be running their machinery throughout the day with no practical output; and they were glad to sell the day-load at a much cheaper rate.

Mr. Van Trump replied that the trams were running up to 11 o'clock at night, and so could hardly be calculated in the day-load. If the Committee had come forward and said they were running the business at a loss to the ratepayers, and that they wanted the £700 or £800 to be secured from an increase in charges to make up this loss, he would have voted for it at once; but it was not right to rearrange the charges without saying why. He had known for the past three years that the business was running at a loss. He believed that some people who had their places fitted up with the electric light would have it out, and gas installed in its place. He was one who, if the increase were sanctioned, would clear out the electric light and have gas instead; while it was possible for a few people to combine and supply their friends. This could be done, provided the highway was not crossed. He moved that the matter be reconsidered; and Mr. Standfast seconded.

Alderman Vile thought Mr. Van Trump should not be too hard on the Committee; and Mr. Tolman hoped it would be made clear that the electric light works had been run at a loss the past three years.

Dr. Macdonald said it was difficult to reply to what had been said, as it was a series of statements that had no foundation whatever. The works had not been carried on at a loss during the last few years. The idea of the Committee was to draw up the charges on something like a logical basis; and every Committee in the country had taken the same course, and gone back to the flat-rate. The idea of making up any loss had not occurred to them. No one had a right to insinuate that the Committee were trying to make up a loss on the trams by charging the consumers extra. Referring to Mr. Van Trump's threat that he would give up the use of the electric light and ask other people in the town to do the same, Dr. Macdonald said he wanted them to consider that the electric light works were the property of the town; and anyone who wished to keep the works from being a success, was doing harm to the town. It did not harm the Electricity Committee; but a man who would injure a concern by taking away its employment, was not, if he might say so, acting in a manner consistent with good citizenship.

Mr. Van Trump: What is the reason for increasing the charges?

Dr. Macdonald said they did not yet know whether they were increasing them. Strictly speaking, they could not reckon definitely on making anything by the increased charges at all, because of the customers they might lose.

The discussion then ended; and the report, with the Committee's recommendations as to the increased charges, was carried by a large majority.

LYTTELTON (N.Z.) GAS AND WATER SUPPLY.

We have received from Mr. G. A. Lewin, the Town Clerk of Lyttelton (N.Z.), his report to the Mayor and Corporation on the municipal work of the year ended the 31st of March. In the course of it, he furnishes the following particulars in regard to the gas and water supply.

In the spring of last year, the Municipal Council decided, on the recommendation of the Gas Committee, to reduce the price of gas for lighting purposes from 8s. 4d. to 6s. 8d. per 1000 cubic feet, which represented an annual concession of £320 on the then output. The results of the year's work have, however, fully justified the step, as the actual receipts from gas and residuals are shown by the accounts to be within £50 of those for the year 1907-8, when the higher rate was charged; while the ascertained net profit, due entirely to gas manufacture, is actually a few pounds in advance—being £790 against £787. Mr. Lewin refers with gratification to the success of the gas undertaking during the six years it has been under municipal control, as the price of gas has been reduced by 33⅓ per cent., the output increased by 150 per cent., the works and plant improved at a cost of £2556 out of revenue, and the rates relieved to the extent of £1200. The gas capital is £20,000; and the gross profit is roughly 8 per cent. upon it.

The following are some working statistics submitted by Mr. Lewin: Coal carbonized, 844 tons; gas made, 10,005,000 cubic feet; gas sold, 9,260,000 cubic feet; coke sold, 346·4 tons; and tar sold, 959 gallons. He points out that, for the first time in the history of the works, the yearly output of gas reached eight figures; while the make per ton of coal continued to rise in a gratifying manner, without bringing to light any of the compensating drawbacks which are so often associated with big makes. In this connection, he quotes the figures for the past three years. During 1907, the make of gas per ton of coal was 11,515 cubic feet; in 1908, it was 11,690 cubic feet; and last year, it had risen to 11,854 cubic feet. For the same period the net cost of coal per 1000 cubic feet sold worked out at the low figures of 4·63d., 3·43d., and 2·95d. respectively. Mr. Lewin says this fact would seem almost to indicate that the Manager (Mr. W. M'Auliffe) is, in the matter of cost of coal per 1000 cubic feet, rapidly approaching the diminishing-point.

Reporting upon the water supply, Mr. Lewin gives figures showing that the total quantity of water pumped to the main reservoir in the past financial year was 59,737,000 gallons, compared with 56,094,000 gallons in 1907-8; the town consumption being 50,576,300 gallons, as against 47,116,800 gallons. The mean consumption per head per day last year was 34·65 gallons, compared with 32·19 gallons. An important change was made at the works by the substitution of producer-gas plant for the old steam plant at the Heathcote Valley pumping-station. Before the new plant was adopted, it was estimated that there would be a probable saving of £290 per annum in fuel on the basis of pumping at that time. The anticipation has been fairly well realized. For the year ended March, 1908 (*i.e.*, the last complete year with the steam plant), 56 million gallons of water were pumped at Heathcote at a fuel cost of £381, or £6 16s. per million gallons; but since the new plant has been at work, it has raised 23 million gallons at a fuel cost of £36, or £1 11s. 3d. per million gallons. At March, 1909, the yearly pumping had risen from 56 millions to 59⅜ millions; and for the present year, with drainage requirements in full swing, a demand of not less than 64 or 65 million gallons may be anticipated, which, on the foregoing basis, represents a saving in fuel of £330 on the year's work. The whole plant, including the producers, engines, and pumps (all in duplicate), new brick building, and an additional rising main, represents a capital outlay of roughly £4500, in the proportion of £3000 for plant, £1000 for building, and £500 for main. The saving in fuel is sufficient to pay 4½ per cent. interest on the total capital expenditure, and then there remains a yearly surplus, which, if invested as a sinking fund on a 4 per cent. basis, would extinguish in 16 years the £3000 spent on the plant. Thus the Corporation have provided themselves with a pumping outfit capable of meeting any anticipated requirements for many years to come, without adding one penny to their yearly interest bill.

Under the title of "Sydney Willey and Co.," a business has been commenced at No. 18, Old Swan Lane, Upper Thames Street, E.C., for the supply of gas-meters, fires, cookers, &c. Mr. Sydney J. H. Willey (brother of the late Mr. H. A. Willey, of Exeter) is connected with the concern.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

In the Hamilton Town Council on Tuesday, the Manager—Mr. J. Ballantyne—reported that the erection of the coal-handling plant would be completed at an early date, and arrangements were made for a formal opening ceremony. Bailie Anderson said that a question was asked at the previous meeting regarding the saving which had been effected by the railway siding. The Manager had since reported, bringing out a gross saving of £667, which would be increased by the coal-handling plant to £850. He thought the Council would agree with him that Mr. Ballantyne had kept well within bounds in his report. He was hopeful that by the end of the year better results would be reported. Ex-Provost Keith said he had gone into the matter quite independently; and the conclusion he arrived at practically confirmed Mr. Ballantyne's estimate.

The Gas Committee of the Denny Town Council on Tuesday reported that the Manager of the Banknock Coal Company had indicated that his Company were now inclined to consider favourably the proposal made by the Council in 1902 to extend the gas-mains to Dennyloanhead—a distance of 4¼ miles. The Committee instructed the Clerk to inquire whether the Company would be prepared to put gas-fittings into the houses belonging to them, and if they would favour the formation of a lighting district. The Colliery Manager had stated that the matter would require to develop slowly, and that he would bring it before his Directors. The subject was accordingly allowed to stand over.

The Dumfries Town Council last week were recommended by the Gas Committee to purchase for use during the year 4000 tons of Sanquhar splint, 2900 tons of Afton coking coal, 1500 tons of Belhaven splint, 2000 tons of Muirkirk splint, 500 tons of Knockshinnock cannel, and 1000 tons of Ormiston cannel—in all, 11,900 tons; also 10,000 gallons of benzol. The total cost was £8254. The average price of coal was 13s. 6½d. per ton; and of coal and benzol almost 13s. 10d. The cost per 1000 cubic feet of gas was 1s. 5½d.; and the yield per ton was estimated at 9500 cubic feet. The recommendation of the Committee was adopted after discussion. The Council remitted to the Joint Managers to inquire and report as to the desirability of extracting the light oils from the tar, and to report as to the repair or rebuilding of the old retort-house.

The Sanquhar Town Council at their last meeting voted an honorarium of £18 to the Town Clerk, in consideration of the extra work he had had in connection with the gas-works during the past year. Plans were passed for a new retort-house and alterations at the gas-works.

The Cambuslang Gas Company, Limited, made a net profit for the past year of £2731. At the annual meeting on Wednesday, it was agreed to pay a dividend of 6 per cent., making 10 per cent. for the year; to place £550 to depreciation; £220 to reserve; and to carry forward £361.

The Comrie Gaslight Company have agreed to pay a dividend of 1s. per share, and to retain the price of gas at 6s. 8d. per 1000 feet.

The Directors of the Methven Gas Company have appointed a deputation to inspect and report on the Ceres Gas-Works, where they understand gas is being made from petrol by Mr. W. Key's process. The introduction of similar plant at Methven would, it is believed, enable gas to be produced at from 4s. to 5s. per 1000 cubic feet, as compared with the present price of 8s. 10d.

At a meeting of the Directors of the Turriff Gas Company, Limited, last week, a resolution was passed placing on record an expression of the great loss the Company had sustained, and the deep regret the Directors felt, by the death of their esteemed Chairman, Provost Hutcheon, who had been associated with the Company since 1858, who had ably acted as Chairman for about forty years, and to whose wise and careful guidance the Company were largely indebted for their present sound position.

In regard to the gas transfer which is under consideration in Carnoustie, it is reported that at a meeting of the Carnoustie Town Council on Monday Provost Soutar called attention to the fact that no reply had been received from the Gas Company with regard to the offer they were asked to submit to the Council as a set-off to the offer which the Council had made for the purchase of the Company's undertaking. He thought he was expressing the opinion of the Council when he said it was their desire to lay before the ratepayers the whole question, and to let them know exactly how they stood. He moved that they call a public meeting on the subject; and this was agreed to.

The Corporation of Kirkcudbright have let the contract for the erection of a new gasholder and tank, tar-column, boiler, engine, and exhauster, to Messrs. Robert Dempster and Sons, Limited, of Elland, at the price of £974.

The Corporation of Dunbar are having extensions effected at the gas-works which are intended to fit them to meet the demand for gas for many years to come. The work entails the erection of a new telescope gasholder, with a capacity of 45,000 cubic feet, in place of one which had a capacity of only 18,000 cubic feet; also the installation of new purifiers, boiler, and engine and tar-extractor, a retort-bench of ten retorts, and a tar-storage tank.

The Committee appointed by the Fraserburgh Town Council to consider as to the acquiring of the control of the gas supply in the burgh reported to the Council recently that, after having fully discussed the subject at a special meeting, they had resolved that, in their opinion, the whole information which could be obtained to enable the Council to decide on the question was contained in the report supplied by Mr. W. B. M'Lusky, of Perth, in 1908, and that the Committee were advised: (1) That the action taken by the Town Council last year under the Burghs Gas Supply (Scotland) Act of 1876 would not preclude its adoption from being raised again at this or any later date; and (2) that the Council would have the right to establish and construct works for the manufacture or storage of gas at the site recently acquired by the Gas Company, without consulting, or obtaining the consent of, the owners of surrounding properties. In the Committee it was agreed, on the suggestion of Mr. G. Low, to report: (1) That, in the opinion of the Committee, it was expedient that the Town Council should acquire control of the gas supply; (2) to recommend and request that a special meeting of the Council be held on Monday, Sept. 6 next, to resolve that the Act be adopted in, and applied to, the burgh of Fraserburgh, and to appoint a day for the holding of the second meeting of the Council on the subject; and to make all other necessary arrangements for the adoption of the Act. The Council unanimously adopted the report of the Committee.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *June* 12.

There has been no recovery from the quietness which prevailed at the beginning of the month. Although deliveries continue on a fairly satisfactory scale, they are largely against contracts made in advance; and, new business being barely enough to remove available supplies, the tendency of prices has again been slightly in favour of buyers. The closing quotations are £10 18s. 9d. to £11 per ton f.o.b. Hull, £11 1s. 3d. to £11 2s. 6d. per ton f.o.b. Liverpool, and £11 5s. per ton f.o.b. Leith. The situation in the forward position is without much change. There is good inquiry for delivery up to the end of the year, but first-hand business has been limited. For delivery over the spring months, 1910, there is not much inquiry, the ideas of makers being quite out of reach.

Nitrate of Soda.

The market remains quiet at 10s. 4½d. per cwt. for 95 per cent., and 10s. 7½d. for refined quality.

Tar Products. LONDON, *June* 14.

Tar products have been steady generally throughout the past week. Pitch is still firm, although the Continent do not appear to be very anxious buyers at present. The Belgium buyers in particular seem to be holding off the market, in the belief that the rise which has lately taken place is not warranted by the actual position of affairs. Seeing, however, that most of the makers are well sold for this year's delivery, and under no necessity to come again into the market until the end of the year, and that supplies of tar are decidedly less than usual for many reasons, they will probably regret this decision when they decide to purchase. Benzol is steadier, and prices have improved somewhat all round. Toluol is very quiet. Solvent is steady, but orders are scarce. Creosote is firm all round, with a fair amount of inquiry. Carbolic acid is quieter; and the majority of the consumers decline to offer for prompt or forward. Crystals are quiet and difficult of sale. Naphthalene and anthracene are unchanged.

The average values during the week were: Tar, 14s. 6d. to 18s. 6d., *ex* works. Pitch, London, 27s. 6d. to 28s.; east coast, 27s. to 27s. 6d.; west coast, 26s. 6d. to 27s. 6d. f.a.s. Mersey ports, 26s. to 27s. f.o.b. others. Benzol, 90 per cent., casks included, London, 6d. to 6½d.; North, 5⅝d. to 6d.; 50-90 per cent., casks included, London, 7d.; North, 6½d. Toluol, casks included, London, 8¼d.; North, 7⅜d. Crude naphtha, in bulk, London, 3d. to 3⅛d.; North, 3d. to 3⅛d.; solvent naphtha, casks included, London, 11d. to 11½d.; North, 10d. to 10½d.; heavy naphtha, casks included, London, 10⅜d. to 11½d.; North, 9⅜d. to 10¼d. Creosote, in bulk, London, 2⅜d. to 2 15/16d.; North, 2⅛d. to 2⅜d. Heavy oils, in bulk, 2 15/16d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 1d. to 1s. 1½d., west coast 1s. 0½d. to 1s. 1d. Naphthalene, £4 10s. to £8 10s.; salts, 35s. to 40s., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market has been quiet throughout the past week, and values are practically unchanged. The Gas Companies still quote £11 10s.; but it is possible to buy outside makes on Beckton terms at £11. In Hull, business is reported to have been done at £11 1s. 3d.; and in Liverpool, at £11 2s. 6d. to £11 3s. 9d. In Leith, business would be possible at £11 5s. to £11 6s. 3d.; but makers are asking more than this.

Quality of Gas at Cheltenham.—At a meeting of the Cheltenham Town Council some time ago, it was decided to forward to the Gas Company a memorial received from residents complaining of the inferior quality of the gas. The Directors have replied to the effect that the quality of the gas supplied in Cheltenham is practically the same as now generally adopted throughout the country. They feel assured that if suitable burners were used, and reasonable attention paid to them, the allegation in the memorial that the gas is less efficient and more expensive than formerly, would be found devoid of foundation. They add that they are willing, when requested by the consumers, to send an inspector to examine fittings and report gratuitously as to any defects; and they are also prepared to continue the free supply of suitable flat-flame burners in place of any old ones of that type still in use.

New Joint-Stock Companies.—The Kingston Lighting Company, Limited, has been registered as a private undertaking, with a capital of £1000, in £1 shares, to carry on the business of gas and general engineers, manufacturers of gas or other light and heat producing agents, incandescent lights, lamps, mantles, and appliances, &c. The registered office is at 52, Brook Street, Hull. The Liverpool Lighting and Heating Company, Limited, with a capital of £1000, in £1 shares, is to carry on the business of manufacturers of, or dealers in, incandescent lights, lamps, mantles, appliances, &c. Other Companies recently registered are the North British Lighting and Heating Company, Limited, of Hull, the Western Incandescent Supply Company, Limited, of Bristol, and the Western Lighting and Heating Company, Limited, of Bournemouth, each with a capital of £1000, in £1 shares. The British Patent Oxide Company, Limited, the capital of which is £12,000, in £1 shares, has been registered to adopt an agreement with Mr. J. Gill, and to acquire and turn to account certain patents for inventions relating to the making of red oxide of iron and other substances, &c.

COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade of the North-East is active for early shipment; but the high prices asked for forward delivery make such sales slight, with the uncertainty as to future working. In the steam coal trade there is a full shipment, and prices are firm—best Northumbrian steams being about 13s. per ton f.o.b. Second-class steams are 11s. per ton; and steam smalls are quiet at from about 5s. 3d. to 6s. 3d. The output is full at present, and it is well taken up. In the gas coal trade there is only a limited home demand; but the exports are very heavy. The tone of the market is firm; and for early delivery the prices are steady. Durham gas coals vary in quotation from about 9s. 6d. to 11s. per ton f.o.b., according to quality; while for the highest class—"Wear Specials"—about 11s. 6d. is the price. It is believed that very large quantities of gas coal are now being sent abroad to make up for deficient supplies in the winter, when frozen canals prevented delivery. As to contracts, it is reported that only a small portion of the Brussels gas coal contract will be taken from Durham; and the price is said to allow about 10s. per ton for second-class coal. Coke is steady, and gas coke is in fair demand; the output being now small, with fair exports. Good gas coke is from 12s. 6d. to 13s. per ton f.o.b.

Scotch Coal Trade.

Trade is more active than it has been for some time. The apprehension is seemingly growing that there may be serious trouble ahead. It is reported that manufacturers are now stocking coal. This has an influence on prices, which are quoted: Ell 9s. 9d. to 11s. 6d., splint 10s. to 10s. 6d., and steam 9s. 3d. to 9s. 6d. per ton, f.o.b. Glasgow. The shipments for the week amounted to 337,280 tons—an increase of 22,016 tons upon the preceding week, and of 8632 tons upon the corresponding week of last year. For the year to date, the total shipments have been 6,014,994 tons—an increase of 420,477 tons upon the corresponding period.

The gross profit of Messrs. Head, Wrightson, and Co. for the year ended April 30 last was £20,123, to which has been added the balance of £1166 brought forward; making a total of £21,289. This the Directors propose to apply as follows: In payment of interest on debentures for the year, £6750; dividend on preference shares to March 31 last, £9302; reserved for dividend on preference shares from March 31 to April 30 last, £845; Directors' fees, excluding management salaries, £2381; expenses of issue of preference shares (balance), £1463; and balance to be carried forward, £546. The Directors much regret that the result of the year's operations has not been so satisfactory as usual, owing to the general scarcity of work and the extreme competition; and they are therefore unable to recommend a dividend on the ordinary shares.

Reduction in Price at Leigh (Lancs.).—At a meeting last week of the Leigh Town Council, Alderman Cowburn said the profit on the gas-works for the past financial year was £3238; and after adding the balance of the previous year, they had a total of £4005. Out of this the Gas Committee suggested that the deficit of £1222 on the water undertaking be paid, leaving a disposable balance of £2782. They recommended that the price of gas be reduced 3d. per 1000 cubic feet. It was resolved that the recommendations of the Committee be approved. Particulars as to the past twelve months' working of the undertaking were given in the "JOURNAL" for June 1 (p. 594).

Middleton Gas Undertaking.—In moving the adoption of the minutes of the Gas Committee, Mr. Parker informed the Middleton Town Council that they had had a falling off at the gas-works during the past year of £1100, as compared with the previous year. The balance-sheet showed that they had a net profit on the past year of £1651. Naturally everybody would ask what they were going to do with it. They were not going to pay anything towards the rates. They had £422 owing in connection with the old debt that they were paying off. By Act of Parliament, they were bound to pay into the fund one-half of the remaining profits for the redemption of annuities. They would thus only have £600 left, and they were committed to spend £2000 in order to be ready for the foggy weather. Alderman Schofield, in seconding the minutes, said that the profit for the past year was, taking everything into consideration, very satisfactory. Mr. Ritchie moved an amendment to the effect that the minutes be passed with the exception of the one to the effect that all charges for hire of stoves be discontinued from June 3, 1909, and that the price of gas used for stoves be the same as that charged for lighting purposes. On being put to the vote, the amendment was defeated; and the minutes were then passed.

Sales of Stocks and Shares.—Last Wednesday, Messrs. A. & W. Richards sold, at the Mart, Tokenhouse Yard, E.C., by order of Directors, some £10 new ordinary 5 per cent. maximum shares in the Southend Water-Works Company at £10 to £10 2s. 6d. each; and new issues of £1000 of 4 per cent. perpetual debenture stock and £8000 of new ordinary stock of the Great Yarmouth Water Company at £103 10s. to £105 and £90 10s. to £96 respectively per £100 of stock. The £20,000 of 5 per cent. ordinary stock recently offered in our columns for sale by tender by the Directors of the East Hull Gas Company was considerably over-subscribed for at prices ranging from £105 (the minimum) to £107 10s. per £100 nominal of stock. Tenders for the purchase of £10,000 of 4½ per cent. preference stock of the Sutton District Water Company were opened last Friday, and amounted to £15,800, at prices ranging from £120 to £121 0s. 6d. per cent.; the latter being the price obtained. Some shares in the Eton Gas Company offered for sale by Messrs. Buckland and Sons at the Castle Hotel, Windsor, on Wednesday last, were sold as follows: 21 "A" original shares of £15 each, fully paid, at £31 per share; one "B" original share of £15, at £19 15s.; 8 new "B" shares of £15, upon which a call of £5 had been paid, at £7 and £6 17s. 6d. each.

HIRING POINTS

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Unprofitable Electricity at Loughborough.

Some time ago, the Loughborough Corporation decided to call in an expert to report on their electricity undertaking, which had proved somewhat of a disappointment to the town; and Mr. J. F. C. Snell, who was selected for the task, has now presented to the General Purposes Committee the results of his investigations. Dealing with the works themselves, he says the cost of repairs appears to have been "utterly abnormal" in 1908 for the size of the plant installed, and includes certain extraordinary expenditure which should not recur. One of the chief causes of the present *impasse* is that the average rate per unit sold is too low, and consequently every additional lighting consumer (at the equitably higher rate paid for lighting) is a step towards the self-supporting stage. An estimate has been made of the output that must be secured before this desirable end is reached; and the figure is placed at 500,000 units, or double the present quantity. The existing practice of the Gas and Electricity Committee, governing both the gas and electrical undertakings, is condemned by Mr. Snell as being unfair to the members of the Committee, to the ratepayers, and to the departments governed; and the formation of an independent Electricity Committee is recommended. In conclusion, Mr. Snell states that the report and analysis has been of the most difficult nature, and he regrets he has been unable to suggest any immediate improvement. He has indicated small alterations in the power-house which will result in some economies. These should amount to a total at the present rate of output of about £300 a year. It is not, however, in the cost of production that the present weakness lies, but in the small output and small revenue on the capital expended. This loss is made up of two factors—(*a*) The temporary disproportionate capital expended on which annual standing charges have to be met; and (*b*) the low charges made for energy supplied. This capital having been invested, it is only by an expansion of business on commercial lines that the department can become self-supporting. A serious loss is made upon the supply to power users. The General Purposes Committee decided not to adopt the recommendation that the electricity undertaking should be placed under the control and management of a separate committee.

Gas Tragedy at Leeds.—Annie Armitage, a Leeds widow, 50 years old, who had been in ill-health for some time, was found dead in her bedroom, with the gas turned full on. A mat had been placed against the door.

Automatic Public Lighting at Edmonton.—The Edmonton District Council has decided to enter into an agreement with the Tottenham and Edmonton Gas Company for the Company to light the district automatically with gas for a period of ten years from the 1st prox., and to supply lanterns and burners complete.

Suicide by Gas at Slattocks.—A verdict of "Suicide during temporary insanity" was returned by the Coroner's Jury who inquired into the circumstances attending the death of Mrs. Devereaux, aged 32, of Slattocks, who was found dead with a shawl round her head and a tube leading from a gas-pipe in her mouth; the gas being turned on. Her husband said she had previously, when out of her mind, tried to do a similar thing.

Water Supply of Bedale.—A Local Government Board inquiry has been held by Dr. Brightmore respecting an application by the Bedale Rural District Council for sanction to borrow sums amounting to £4000 for the purposes of water supply for the townships of Bedale and Aiskew, including the execution of works in the township of Rand. Mr. F. G. Fairbank, an Engineer, of York, said that the population of Bedale and Aiskew was 1400; and the proposed supply was 15 gallons a day per head, or 75 gallons per house, equal to a supply of 21,000 gallons. The gauging of the springs in the Keepers' Wood on four occasions since 1897 to last August showed that there were 61,000 gallons a day, even when taken at an exceptionally dry season, and when the flow of the springs was the lowest known for many years. The reservoir would be situated on the highest ground in the immediate neighbourhood. Mr. Horner, on behalf of the farmers in the district, objected to being saddled with the expenditure when they would reap no benefit from the scheme. Mr. Fairbank pointed out that it had not been definitely settled whether the cost should be borne by the whole district or by consumers only. He said it was the best scheme under all the circumstances. There would be almost twice the quantity of water that would be required. The Inspector said the Local Government Board could not sanction the scheme until the wayleaves were settled; so that the matter would have to remain in abeyance pending some final agreement being entered into.

Gas-Works' Results at Colwyn Bay.—At the last meeting of the Colwyn Bay Urban District Council, the Lighting Committee reported a make of gas for last year of 72,400,000 cubic feet. Of this, 61,061,500 feet were sold, 1,075,000 feet used on works, &c., and 10,263,500 feet unaccounted for. Mr. Dickin, the Chairman of the Committee, said some of the mains had been laid twenty years, which might have something to do with the leakage of 14 per cent. He had no doubt the Committee dealing with the matter would see that this leakage was reduced to normal proportions. The profit and loss account showed a serious loss; and, as things were, he considered it time the Council began to pay for the lighting of the town, instead of putting this expense on the gas and electric light concerns. The figures he had before him showed a loss of £1942 on the year's working. But the situation really was not so bad as it looked on paper, for during the past two years the Council had been spending a lot of money on the works, necessitating the borrowing of £20,000, and by way of interest and sinking fund they had to pay £1000 last year. In addition, they had to pay £550 in the shape of extra rates. Another £1000 was due to the expense of lighting the streets. In fact, the concern was never more prosperous *per se* than it was at present; for they were ready to supply every house that could be built. At the same time, his opinion was that the Council had not had good financing in these matters for a long time. As a Committee had been appointed to go into the whole question, he hoped the Council would let the matter be where it was till the Committee reported. The minutes of the Lighting Committee were adopted.

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The Proposed Pension Scheme at Coventry.

In a report to be laid before the Coventry Town Council at their next meeting, the Gas Committee state that they have gone carefully into the whole circumstances regarding the proposed establishment of a scheme for granting pensions to certain men who have served the department for long periods, and whose services it will be necessary to dispense with owing to the discontinuance of gas manufacture at the old works. The Committee state that they still consider the best way of dealing with the matter is by the establishment of a scheme for weekly payments on the lines of that presented to the Council at the last meeting. It is impracticable to adopt the suggestion which was made at the Council meeting, that arrangements should be entered into to retain the men in the employment of the department, as the staff is fully adequate for all requirements. The continued employment of these men would hamper rather than facilitate the work. The only course open, therefore, is to dispense with their services; and, this being the case, the Committee adhere to the opinion which they expressed in their former report that, though the Corporation are under no obligation in the matter, it will be equitable to make some provision for these men. The Committee think that probably a modification of the scheme presented at the last meeting will meet the views of the Council; and they have accordingly prepared an amended scheme, whereby the weekly payments in the case of all the three classes are reduced by 2s. Men who have served 25 years and over are to be paid 10s. per week; those who have served for 20 years but less than 25 years, 8s. a week; and men who have served 10 years and less than 20 years, 6s. a week. It has been ascertained that the number of men qualified to receive the benefits of the scheme is eighteen; and the total amount involved is £369, which represents the maximum annual cost of the scheme. This will, of course, become less as time goes on, and the number of pensions is diminished.

Purification of the Thames.—In the recently published annual report of the Conservators of the Thames, it is stated that during the past year sewage from twelve places, representing a population of 17,000 persons, was diverted from the river and the streams connected therewith. Works for the purification of drainage are now in operation at nearly all towns and centres of population; and where, in a few instances, pollution still reaches the streams, sewage-disposal systems have been carried out.

Gas Profits at Devonport.—In spite of the agitation and criticism which marked the history of the Devonport Gas-Works during the past year, the undertaking appears to have had a very prosperous time. At the meeting of the Town Council on Thursday last, Alderman Tozer, the Chairman of the Gas Committee, stated that the annual report was in preparation, and would be presented at the next meeting. It would show a net profit of £1612, which was more than double the amount realized last year.

Improvement of the Ashburton Gas-Works.—At the last meeting of the Ashburton Urban District Council, a discussion took place on the question of improving the gas-works. Mr. J. A. Gray, the Manager of the Teignmouth Gas-Works, had made an inspection at the request of the Gas Committee, and recommended a number of alterations and additions, with a view to effecting economy in the working. One of the main suggestions was the erection of a new and larger holder. The Council empowered the Gas Committee to enter into negotiations for a site for the holder, and also ascertain on what terms money could be obtained for carrying out the proposed improvements.

Street Lighting in Leeds.—The Street Lighting Committee of Leeds, in their annual report to the Corporation, state that the work of converting the ordinary lamps from single flat-flame to incandescent has been continued; and 563 lamps in various parts of the city have been so altered during the year. The Committee have under consideration the question of adopting a system of automatic lighting and extinguishing of public lamps. As an experiment, 100 automatic controllers have been purchased and fixed in various parts of the city. Electric arc lighting has been substituted for gas lighting as follows: Aire Street, 6 lamps; Whitehall Road, 25; Kirkstall Road, 22; Central Road, 4; subway from Whitehall Road to Gelderd Road, 4.

Gas-Lighting for Schools.—The Plymouth Education Committee, at their last meeting, had under consideration the question of improving the lighting of the schools. Estimates were submitted by the Corporation Electrical Engineer and the Superintendent of Street Lighting with reference to two of the schools. In the case of the Regent Street Intermediate School, the Electrical Engineer estimated the cost of installing electric light at £170; while the estimate of the cost of bringing the gas lighting thoroughly up-to-date was £54. The other case was that of the Corporation Grammar School, the estimates for which were: Electrical installation, £110 10s.; improved gas service, £25 10s. The Committee decided to have the gas service of both schools improved, and asked the Superintendent of Street Lighting to examine and report on the whole of the gas-fittings in the schools of the borough.

Alleged "Offensive Effluvia" from the Wrexham Gas-Works.—The attention of the Wrexham Gas Company having been called to complaints of smells in the neighbourhood of the sulphate works, the Secretary has written to the Health Committee pointing out that, as the Medical Officer had already reported, there was nothing prejudicial to health in such smells. He added a suggestion by the Directors that the complaint might arise from some other source—possibly the refuse destructor at the Corporation depôt. When the letter came before the Committee, Mr. Williams said there was no doubt about the smells being noxious; for a large number of people intended to leave their houses in consequence of them. If this were so, it could easily be imagined what deterioration of property in the neighbourhood would follow. The Mayor (Mr. Thomas Sauvage) thought a letter like the one from the Gas Company ought not to be addressed to the Council. It was decided that the Medical Officer and the Sanitary Inspector should look out for a recurrence of the nuisance, and that they would report the matter, if necessary, to the Local Government Board.

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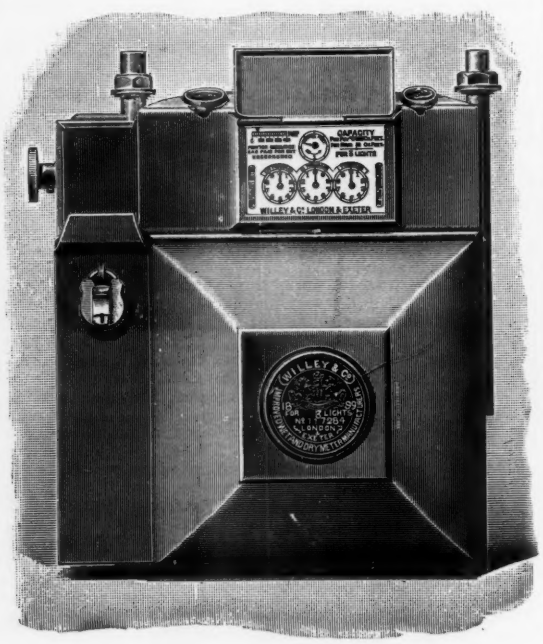

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AGENTS FOR SCOTLAND

D. M. NELSON & CO., 53, WATERLOO STREET, GLASGOW.

Messrs. Harold Nickson and Co., Limited, of Manchester, send a renewal of their glass paper-weight calendar, which was distributed some years ago.

Mr. F. H. Tulloch held an inquiry at Cymmer last Tuesday into a proposal by the Glyncorrwg Urban District Council to borrow £700 for the extension of their gas-works. There was no opposition.

A contract has been placed with Messrs. Willey and Co., Limited, of London and Exeter, by the Devonport Corporation for five 15-inch and two 10-inch Simpson's patent station governors, together with the necessary valves and connections.

Last Wednesday, gas-works were opened at Woodford Halse by Mr. G. A. Sheppard, who was supported by a large and influential body of parishioners. After the opening ceremony, a party of about fifty dined at the White Hart Hotel, as the guests of the promoters of the undertaking.

Messrs. C. & W. Walker, Limited, of Donnington, send us one of the hand-blotters which they are distributing among gas engineers and secretaries. On the front of the blotter are numerous views of work carried out by the firm; a glazed surface being provided along which the hand glides smoothly.

It is reported that the Hipperholme Urban District Council have secured a six months' option for the purchase of the Bailiffe Bridge Gas Company's undertaking. The Hipperholme district is at present supplied from Halifax; and the Council have been endeavouring to secure better terms from the Corporation.

On the recommendation of the Finance Committee, the Burslem Town Council have agreed that, in pursuance of resolutions passed by the Electric Lighting Committee and the Gas Committee, the Borough Treasurer be authorized to transfer the sum of £1700 from the electric lighting fund and of £5000 from the gas fund to the credit of the new public buildings fund.

The Paddington Guardians have prepared a statement showing the cost of gas and electric light in the several establishments under their supervision during the last ten years. In 1899-1900, the amount paid for gas was £754, and for electric light £245; in 1903-4, the figures had risen to £819 for gas and £540 for electric light; while in the year 1908-9, they were £740 and £617.

At the Parish Hall, Edison Road, Crouch End, under the management of the Hornsey Gas Company, an interesting and instructive exhibition is now being held. Among the exhibits are Richmond and Davis cookers; Bland lights; and high-pressure illumination and other specialities by Mr. W. Edgar. We may next week take an opportunity of referring more fully to what is to be seen.

The Brighouse Gas Committee have interviewed nine selected candidates for the position of Manager of their works, for which a commencing salary of £250 is offered; and as a result, the number was further reduced to two. The Committee then decided to send a deputation to visit the gas-works in which these applicants are at present engaged, after which the appointment would be finally made.

The Coleraine Urban District Council recently discussed tenders from thirteen firms containing offers for the supply of 33 different classes of gas coal. After careful consideration, it was resolved that the Council be recommended to accept the tender of Mr. Thomas Duncan for the supply of 1000 tons of Walker's silkstone double screened, delivered at Coleraine harbour, and also the tender of the Eveson Coal and Coke Company, Limited, for the supply of 1000 tons of Wrexham coal on the same conditions.

At the Jarrow Police Court last Thursday, Andrew Durham was sentenced to two months' imprisonment on each of two charges of being on enclosed premises for an unlawful purpose and doing wilful damage to a gas-meter belonging to the South Shields Gas Company. It was stated that early last Tuesday morning, Durham was found in the gas-works. He told a police constable that he was working on the night-shift; but as a matter of fact he was not employed by the Company at all. He had done some serious damage to a gas-meter with a hammer and chisel.

On the occasion of their annual outing recently, the employees of the St. Austell Gas Company visited Truro, and proceeded thence by steamer to Falmouth. While at Truro, they visited the gas-works, and were made welcome by the Manager (Mr. S. J. Ingram). At Falmouth, the party was joined by Mr. H. H. Hoare, the Manager of the Falmouth Gas-Works, and Mr. Gatheridge, the Manager of the Fowey Gas-Works. Mr. H. E. Riley, the Manager of the St. Austell Gas-Works, was heartily thanked at luncheon for the excellent arrangements, and in reply commented upon the good relations existing between the Directors of the Company and their employees.

The output of the Ryde Water-Works has, in thirty years, risen from 100 million gallons to 220 million gallons; and in order to provide against any possible contingency, the Town Council last Tuesday, with only two dissentients, agreed to apply to the Local Government Board to approve a loan of £5000 for carrying out the first portion of an improved scheme, the plans of which were furnished by Mr. Matthews. Mr. Randall said they were prepared to run the risk of a little unpopularity, but they could not jeopardize their water supply for the sake of an increased yearly rate of 2d. in the pound. The new scheme includes the abolition of the upper reservoir, and placing the whole of the supply under ground. The opponents held that a smaller expenditure would meet the requirements of the district.

The "Barrow News" for the 12th inst. says: "We had the opportunity of inspecting a fire burning the new coalexld fuel at the Imperial Hotel, Barrow, last Wednesday. It had been alight for two hours, and was burning brightly and giving out great heat. This fuel gives a clean, bright red fire, does not produce smoke, and is only half the price of best coal. The process by which it is produced at gas-works enables gas companies to dispose of all the coke they produce at a higher price than is obtained for ordinary coke. In many of the big towns of the country it is being largely used, and is growing in popularity every day. Freedom from arsenic is one of the good features of the new comer, which, by the way, won a diploma of merit at the Smoke Abatement Exhibition in Sheffield last March."

MEETING OF THE INSTITUTION OF GAS ENGINEERS LONDON.

June 15 to 18, 1909.

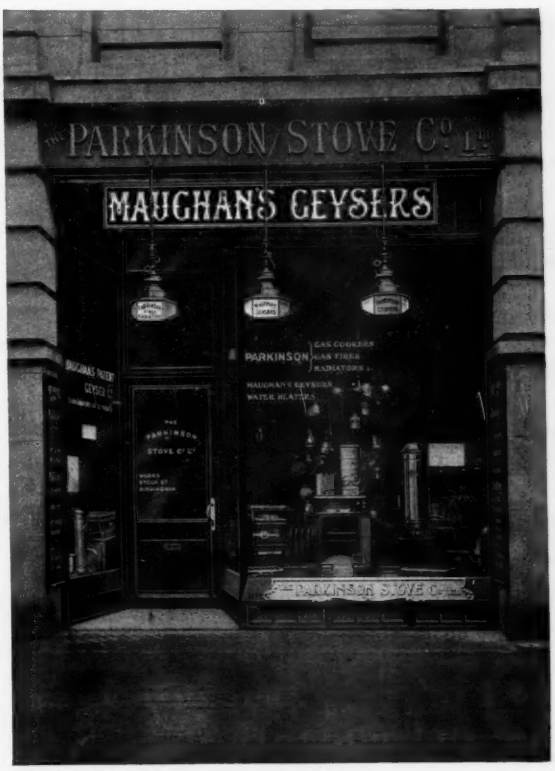
When in London make a point of seeing the **NEW SHOW-ROOMS** of

THE PARKINSON STOVE CO., LTD.

(Incorporating Maughan's Patent Geyser Co.),

At 129, HIGH HOLBORN, W.C.

(close to Kingsway and adjoining the British Museum Tube Station).



They are full of interest and replete with **Modern Gas Appliances** embodying the latest Models in

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Radiators, Fires,
Maughan's Geysers,

and other

Water Heating Appliances.

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LONDON:
Office and Show-Room:
129, HIGH HOLBORN,
W.C.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

MAINS SUPERINTENDENT (£400 PER ANNUM). South Metropolitan Gas Company. Applications by June 19.
WATER ENGINEER (BOMBAY). Applications to Messrs. John Taylor, Sons, and Santo Crimp, by July 1.
DRAUGHTSMAN. No. 5107.
ESTIMATOR (GAS, WATER, AND SEWERAGE WORKS). Applications to J. & H. Robus, Strand, W.C.
SHOW-ROOM SALESMAN. No. 5106.
GAS FITTER. Cradley Heath Gas Company.

Situations Wanted.

ENGINEER AND MANAGER OR ASSISTANT. No. 5104.
PRODUCER GAS AND AMMONIA RECOVERY WORKS. No. 5105.
SECRETARY, MANAGER, OR ACCOUNTANT. W. B. Mimmack, St. Paul's Cray.
SULPHATE, LEADWORK, &c. 117, Galloway Road, Shepherd's Bush, W.

Correspondence Classes.

CORRESPONDENCE COLLEGE COMPANY. Department B., Cambridge.

Plant, &c. (Second-Hand), for Sale.

ASCENSION PIPES, &c., CONDENSERS, PURIFIERS, GOVERNOR, ENGINE AND EXHAUSTERS, WEIGHBRIDGE, &c. Draycott Gas Company.
EXHAUSTERS, &c. Stirling Gaslight Company. Tenders by June 30.
GAS-WORKS PLANT. Long Eaton Gas Company.
PURIFIERS, &c. Bridlington Gas Company.
PURIFIERS, &c. Sutton Gas Company.
STATION METER. T. G. Marsh, Manchester.
WASHERS, &c. Romford Gas-Works.

Stocks and Shares.

DRAKES LIMITED. June 18.

TENDERS FOR

Coal and Cannel.

BAKEWELL URBAN DISTRICT COUNCIL. Tenders by June 25.
BEVERLEY GAS DEPARTMENT. Tenders by June 24.
HUDDERSFIELD GAS DEPARTMENT. Tenders by June 23.
KESWICK GAS COMPANY. Tenders by June 23.
LIMERICK GAS COMMITTEE. Tenders by June 21.
MANSFIELD GAS DEPARTMENT. Tenders by June 19.
MARPLE GAS DEPARTMENT. Tenders by June 30.
NEWRY GAS DEPARTMENT. Tenders by June 25.
OLDBURY GAS DEPARTMENT. Tenders by June 26.
WOMBWELL URBAN DISTRICT COUNCIL. Tenders by June 30

Engine (Gas).

SWADLINCOTE GAS DEPARTMENT. Tenders by June 30.

Exhauster, Governor, Valves, &c.

SWADLINCOTE GAS DEPARTMENT. Tenders by June 30.

Gasholder and Tank.

SWADLINCOTE GAS DEPARTMENT. Tenders by June 30.

Lime.

MANSFIELD GAS DEPARTMENT. Tenders by June 19.
MARPLE GAS DEPARTMENT. Tenders by June 30.

Tar and Liquor.

BAKEWELL URBAN DISTRICT COUNCIL. Tenders by June 25.
FARNWORTH AND KEARSLEY GAS COMPANY. Tenders by June 23.
KESWICK GAS COMPANY. Tenders by June 23.
MANSFIELD GAS DEPARTMENT. Tenders by June 19.
MARPLE GAS DEPARTMENT. Tenders by June 30.
OLDHAM GAS DEPARTMENT. Tenders by June 22.
READING GAS COMPANY. Tenders by June 21.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 706.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 16	10	Alliance & Dublin 10 p.c.	17½–18	..	5 11 1
298,955	10	,,	7	Do. 7 p.c.	12½–13	..	5 7 8
310,000	Stk.	Jan. 14	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
200,000	5	May 27	6½	Bombay, Ltd.	5½–5⅝	..	5 12 7
40,000	5	,,	6½	Do. New, £4 paid	4⅛–4¼	..	5 18 10
50,000	10	Feb. 25	14	Bourne-mouth Gas and Water } 10 p.c.	28½–29½	..	4 15 9
51,810	10	,,	7	Do. B 7 p.c.	16½–17	..	4 2 4
53,200	10	,,	6	Do. Pref. 6 p.c.	15⅜–15⅝	..	3 15 7
380,000	Stk.	,,	12½	Brentford Consolidated	250–252	..	4 19 2
300,000	,,	,,	9⅜	Do. New	193–195	+4	4 17 5
50,000	,,	,,	5	Do. 5 p.c. Pref.	122–124	..	4 0 8
206,250	,,	June 11	4	Do. 4 p.c. Deb.	99–101*	..	3 19 3
220,000	Stk	Mar. 12	10⅝	Brighton & Hove Orig.	212–214	..	5 0 6
246,320	,,	,,	7½	Do. A Ord. Stk.	154–156	..	4 19 4
460,000	20	Apl. 16	10	British	42⅝–43½	..	4 12 6
109,000	Stk.	Feb. 25	6	Bromley, A 5 p.c.	119–121	+1	4 19 2
165,700	,,	,,	4½	Do. B 3½ p.c.	89–91	+½	4 18 11
82,278	,,	,,	5⅜	Do. C 5 p.c.	108–110	..	5 0 0
500,000	10	May 13	7	Buenos Ayres (New) Ltd.	13⅜–14⅛	+⅛	4 18 3
250,000	Stk.	Dec. 11	4	Do. 4 p.c. Deb.	94–96	..	4 3 4
100,000	10	—	—	Cape Town & Dis., Ltd.	4⅛–5	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	5⅜–6	..	—
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	48–49	..	6 2 5
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	78–80	+1	5 12 6
157,150	Stk.	Feb. 25	5	Chester 5 p.c. Ord.	109–111	..	4 10 1
1,493,280	Stk.	Mar. 12	5⅝	Commercial 4 p.c. Stk.	108–110	..	4 14 6
560,000	,,	,,	5	Do. 3½ p.c. do.	103–105	+1	4 15 3
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	81–83*	+½	3 12 3
800,000	Stk.	,,	5	Continental Union, Ltd.	96–98*	–½	5 2 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	135–137*	–½	5 2 2
492,270	Stk.	—	5	Derby Con. Stk.	121–123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk.	103–105	..	3 16 2
148,995	,,	Mar. 31	5	East Hull 5 p.c. Ord.	100–102	+3	4 18 0
486,090	10	Jan. 28	12	European, Ltd.	24–24½	..	4 18 0
354,660	10	,,	12	Do. £7 10s. paid.	18–18½	..	4 17 4
15,161,545	Stk.	Feb. 11	4/10/8	Gas light and Coke } 4 p.c. Ord.	103–104	–½	4 7 0
2,620,000	,,	,,	3½	3½ p.c. max.	88–89	..	3 18 8
3,799,735	,,	,,	4	4 p.c. Con. Pref.	105–107	..	3 14 9
4,193,975	,,	June 11	3	3 p.c. Con. Deb.	84–85*	–½	3 10 7
258,740	Stk.	Mar. 12	4½	Hastings & St. L. 3½ p.c.	93–95	..	5 0 0
82,500	,,	,,	6½	Do. do. 5 p.c.	118–120	..	5 4 2
70,000	10	Apl. 29	11	Hongkong & China, Ltd.	17½–18	..	6 2 3
123,570	Stk.	Mar. 12	6½	Ilford A and C	138–140	..	4 12 10
65,782	,,	,,	5	Do. B	105–107	..	4 13 6
63,000	,,	Dec. 30	4	Do. 4 p.c. Deb.	102–104	..	3 16 11
4,940,000	Stk.	May 13	8	Imperial Continental	179–181	..	4 8 5
473,600	Stk.	Feb. 11	3½	Do. 3½ p.c. Deb. Red.	95–97	..	3 12 2
195,242	Stk.	Mar. 12	6	Lea Bridge Ord. 5 p.c.	120–122	..	4 18 4

Issue	Share.	When Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Feb. 25	10	Liverpool United A.	225–227	..	4 8 1
718,100	,,	,,	7	Do. B	168–170	..	4 2 4
306,083	,,	Dec. 30	4	Do. Deb. Stk.	105–107	..	3 14 9
75,000	5	June 11	6	Malta & Mediterranean	4⅜–4⅝*	..	6 3 1
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	100–102	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	101–103	..	4 7 5
541,920	20	May 27	3½	Monte Video. Ltd.	12⅜–13	+⅛	5 7 8
1,775,892	Stk.	Feb. 25	4½	Newc'tle & G'tesh'd Con.	106⅝–107⅜	..	4 3 9
518,795	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	91–93	..	3 15 3
15,000	10	Feb. 25	10	North Middlesex 10 p.c.	19⅝–20	..	5 0 0
55,940	10	,,	7	Do. 7 p.c.	13–13⅛	..	5 3 8
300,000	Stk.	Apl. 29	8	Oriental, Ltd.	137–139	..	5 15 1
60,000	5	Mar. 31	8	Ottoman, Ltd.	6–6¼	..	6 8 0
31,800	53	Feb. 25	13	Portsea Island A.	137–139	..	4 19 0
60,000	50	,,	13	Do. B.	129–131	..	4 19 3
100,000	50	,,	12	Do. C.	119–121	..	4 19 2
114,800	50	,,	10	Do. D and E.	101–103	..	4 17 1
398,490	5	May 13	7	Primitiva Ord.	6⅞–7	..	5 0 0
796,982	5	Jan. 28	5	Do. 5 p.c. Pref.	5⅛–5⅜	..	4 10 11
488,902	100	June 1	4	Do. 4 p.c. Deb.	94–96	..	4 3 4
1,000,000	10	Apl. 29	8	River Plate Ord.	14⅞–15⅛	..	5 4 11
312,650	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	95–97	..	4 2 6
250,000	10	Mar. 31	8	San Paulo, Ltd.	13⅞–14⅛	..	5 12 3
62,500	10	,,	—	Do. 6 p.c. Pref.	11⅞–12⅛	+⅛	4 18 0
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	50⅜–51⅛	..	4 17 1
135,000	Stk.	Mar. 12	10	Sheffield A	236–238	..	4 4 0
209,984	,,	,,	10	Do. B	233–235	..	4 5 1
523,500	,,	,,	10	Do. C	234–236	+1	4 4 9
70,000	10	June 11	10	South African	13⅜–14*	..	7 2 10
6,429,895	Stk.	Feb. 11	5/6/8	South Met., 4 p.c. Ord.	122–124	–1	4 6 0
1,895,445	,,	Jan 14	3	Do. 3 p.c. Deb.	85–86	..	3 9 9
209,820	Stk.	Mar. 12	8	South Shields Con. Stk.	152–154	..	5 3 11
605,000	Stk.	Feb. 25	5⅛	S'th Suburb'n Ord. 5 p.c.	120–122	..	4 10 2
60,000	,,	,,	5	Do. 5 p.c. Pref.	122–124	..	4 0 8
117,058	,,	Jan. 14	5	Do. 5 p.c. Deb. Stk.	124–126	..	3 19 4
502,310	Stk.	May 13	5	Southampton Ord.	110–112	..	4 9 3
120,000	Stk.	Feb. 25	6⅔	Tottenham A 5 p.c. and B 3½ p.c.	132–134	..	5 0 9
423,940	,,	,,	5⅓		111–113	..	4 12 11
149,470	,,	Dec. 30	4	Edmonton 4 p.c. Deb.	101–103	..	3 17 8
182,380	10	June 11	8	Tuscan, Ltd.	8⅛–9*	..	8 17 10
149,900	10	Jan.	5	Do. 5 p.c. Deb. Red.	101–103	..	4 17 1
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p.c. max.	105–107	..	4 13 6
255,636	Stk.	Feb. 25	6⅓	Wands-worth B 3½ p.c.	139–141	..	4 12 2
79,416	,,	Dec. 30	3	3 p.c. Deb. Stk.	73–75	..	4 1 1
895,872	,,	Feb. 25	5⅓	West Ham 5 p.c. Ord.	121–123	..	4 5 4
210,000	,,	,,	5	Do. 5 p.c. Pref.	125–127	..	3 18 9
253,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.	107–109	..	3 13 5

Prices marked * are "Ex div."

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For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

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PALMERSTON HOUSE,
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"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON 182 Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

LUX'S GAS PURIFYING MASS.
See Advertisement on p. 750.
FRIEDRICH LUX, LUDWIGSHAFEN-AM-RHEIN.

BROTHERTON & CO., LIMITED.
Offices: City Chambers, LEEDS.
Correspondence invited.

APPLY TO THE
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DERBY, ENGLAND,
FOR REALLY HIGH-CLASS
ELEVATORS AND CONVEYORS
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DRIVING AND CONVEYOR CHAINS.

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Apply, THOMAS HORROCKS
Albert Chemical Works, BRADFORD, MANCHESTER.
Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Sulphate of Ammonia.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

"VITERNUS" METALLIC PAINT FOR GAS-WORKS PLANT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "ENAMEL." National Telephone 1759.

PINCHBECK'S Meters and Burglar PROOF STRONG BOX.
See illustrated advertisement, June 8, p. I. of Centre.
PINCHBECK LIMITED, Adams Place, George's Road, HOLLOWAY, N.

DELLWIK-FLEISCHER WATER GAS.
BLUE WATER GAS, CARBURETTED WATER GAS, SELF-CARBURETTING.
FOR Particulars of Annual Generating Capacity of Plants built or in course of construction, see Advertisement in the "JOURNAL" for June 8, p. 607.
The DELLWIK-FLEISCHER WATER GAS SYNDICATE, 25, Victoria Street, Westminster, LONDON, S.W. Telegraphic Address "Dellwik, London."

R. & G. HISLOP,
GAS ENGINEERS, RETORT BUILDERS, CONTRACTORS, &c.
RETORT SETTINGS, COAL-TESTING PLANT, BOILER FIRING.
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SPENCER'S PATENT HURDLE GRIDS.
THE very best Patent Grids for Holding Oxide Lightly.
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REPAIRS RECEIVE PROMPT ATTENTION.
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CARBURINE FOR GAS ENRICHING.
ALSO
THE MAXIM PATENT CARBURETTOR.
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Wires: "AUTOMATIC, MANCHESTER."
40 YEARS' REPUTATION.
WET, DRY, ORDINARY and PREPAYMENT, STATION METERS, &c.
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Established 1887.
Advertiser, who is Shipping Agent to several Gas Companies, Municipalities, and Gas Material Makers, would be glad to undertake SHIPMENT OF GOODS ordered by Colonial Gas-Works or Others.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers, Works: BIRMINGHAM, LEEDS, WAKEFIELD, and SUNDERLAND.

GAS OILS.
MEADE-KING, ROBINSON, & CO. Represent the Strongest Independent Refineries in America; also Petroleum Spirit for Gas Enrichment. 18, EXCHANGE STREET, MANCHESTER, and 11, OLD HALL STREET, LIVERPOOL.

SULPHURIC ACID.

SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: OLDBURY, WEDNESBURY, AND STAFFORD.
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"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the enrichment of Gas.
Manufactured and supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

FIDDES-ALDRIDGE
SIMULTANEOUS Discharging-Charger. The one Machine which Discharges and Charges at One Stroke.
See Advertisement, May 4, p. II. of Centre.
ALDRIDGE AND RANKEN,
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Telegrams: "MOTORPATHY, LONDON." Telephone: 5118 WESTMINSTER.

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K. & A. WATER-GAS COMPANY, LTD.
89, VICTORIA STREET, S.W.

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(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manu- facture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
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OXIDE OF IRON FOR GAS PURIFICATION.
Please Address Inquiries for Analysis and Prices to the
NEW WESTBURY IRON COMPANY, LTD.
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WITH AND WITHOUT DIALS.
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MOVEMENTS FOR CLOCKS, PHOTOMETERS AND BAROGRAPHS, WHEELS, PINIONS AND WORMS.
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SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
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D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DACOLIGHT LONDON." Telephone: 2336 HOLBORN.

KINGS Patent Agency, Limited, 165, Queen Victoria Street, London, E.C. Director Benj. T. King, A.I.M.E., British Chartered Patent Agent (Regd. by Exam.). Telep. 632 Central. Teleg. "Geologic," London. We sustain over quarter of a century's Experience and Reputation for Patenting Inventions and Registering Trade Marks throughout the World.
Write or call. We attend and advise you free.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

TO Gas Managers, &c., Wanted, Old Condemned GAS-METERS, from 1-light to 1000-light, for destruction to re-claim Metals. Write for Prices, Stating Quantities and Sizes, and if Wets or Drys. Scrap Metals, Drosses, Metal Shop Sweepings, &c., also bought.
J. WILSON, Pleasant Grove, York Road, King's Cross, LONDON, N.

AMMONIACAL Liquor wanted.
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HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
Read Holliday and Sons, Ltd., Huddersfield.

CITY AND GUILDS EXAMS., 1910.

FULL Courses now starting in Gas Engineering and Gas Supply; also courses for Matric., Inter., and Final B.Sc. (Engineering), Student and Assoc M.Inst.C.E., Chemistry, Drawing, Building Construction, Practical Mathematics, Steam, Mechanics, &c.
Correspondence College Co., Dept. B., 26, Green Street, Cambridge.

MR. W. B. MIMMACK, for many years Secretary, Manager, and Accountant of the Crays Gas Company (111 Millions), now in Amalagmation, seeks APPOINTMENT in any or all of these Offices.
St. Paul's Cray, Kent.

GAS Engineers attending the Meetings of the Institution of Gas Engineers are cordially INVITED TO VISIT us at 49, 50, and 51, Wool Exchange, Coleman Street, E.C. We can show you the TWIN-LIGHT BURNER, which, on low pressure, puts up Lighting Values at least 50 per Cent. This is no idle boast.

WILL Candidates for the Post advertised in the "JOURNAL," under date of June 1, No. 5101, accept this Acknowledgment of their Applications, together with THANKS for the Particulars furnished. At the same time the Advertisers desire to intimate that THE POST HAS NOW BEEN FILLED.

SULPHATE Leadwork, Repairs, Alterations, New Saturators by a Journeyman PLUMBER of Great Experience. Worked at Beckton, Sheffield, Dublin, &c. Work Guaranteed and at lowest possible Prices. Own Plant. Any Distance for Odd Work. Day or Contract. Leadburner.
117, Gallaway Road, Shepherd's Bush, London.

TO GAS POWER USERS.

MANAGER, with large Experience of Producer Gas and Ammonia Recovery, would like to hear of large firm who have a VACANCY, or are thinking of adopting same. Can Design Plant suitable for 1000 to 30,000 H.P. Accustomed to large Gas-Engines, and can apply Gas to any Industrial purpose requiring a Temperature up to 1300° C.
Address No. 5105, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, A Situation as Engineer and MANAGER of Gas-Works producing 50 to 200 Million Cubic Feet per Annum, or ASSISTANT in Larger Works. Advertiser is thoroughly familiar with the Duties of either Position, including Office Work, and working accounts, is a Practical Engineer and Expert Draughtsman, thoroughly Steady and Reliable.
Full Particulars as to Qualifications and Character on Application to No. 5104, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

THOROUGHLY Qualified Estimator required in Connection with Gas, Water, and Sewerage Works.
Applications, with full Particulars and Salary required, to Messrs. J. & H. Robus, Norfolk House, Norfolk Street, Strand, W.C.

WANTED, a competent Draughtsman. One used to Producer and Retort Setting Work preferred.
Apply, by letter, stating Age, Experience, and Salary expected, to No. 5107, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

SHOW-ROOM Salesman required by Gas Company in London. Must have had previous Experience and be able to Advise Consumers on the latest Methods of Lighting and Heating by Gas. Salary 35s. a week.
Apply, by letter, stating Age and Experience, to No. 5106, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

APPOINTMENT OF WATER ENGINEER TO THE CITY OF BOMBAY.

THE Corporation of the City of Bombay are desirous of Appointing a WATER ENGINEER for the Municipality.
Candidates must be between the Ages of 30 and 40, and must be Members or Associate Members of the Institution of Civil Engineers, and must possess considerable Experience in the Design and Administration of Water-Works Undertakings.
The Salary is fixed at 1200 Rupees per Mensem as a Minimum, and 1800 Rupees per Mensem as a Maximum.
Full Particulars as to the Appointment, Pension, Leave, and other Matters, can be obtained at once from us by sending a directed foolscap envelope.
All Applications must be directed to us and be received not later than July 1, 1909.
By Order of the Municipal Commissioner.
John Taylor, Sons, and Santo Crimp, M.M.Inst.C.E.
Caxton House, Westminster, London, S.W.

WANTED, a Gas-Fitter well up in Iron and Compo.; also an Experienced SERVICE-LAYER.
Apply, stating Age and Wages required, to the Cradley Heath Gas Company, Staffs.

THE South Metropolitan Gas Company have a Vacancy for a MAINS SUPERINTENDENT, who will be required to reside on the Company's District and within Three Miles of the Chief Office.
Commencing Salary, £400 per Annum.
Applications, giving Particulars of Candidate's Qualifications and Career, together with a *copy* of Birth Certificate (and, if available, a recent Photograph), to be sent to the undersigned, endorsed "Application for Mains Superintendent," on or before the 19th inst.
Fredk. McLeod, Secretary.
June 10, 1909.

ADVERTISER has to Offer, for Immediate Delivery by Railway Trucks, in Large or Small Quantities, Fine Material from a large English Iron-Works, containing from 45 per cent. to 60 per cent. FERRIC OXIDE, and should be Useful for Gas Purification Purposes. Free Sample sent on Application.
Address No. 5102, care of Mr. King, 11, Bolt Court Fleet Street, E.C.

FOR SALE—Three Purifiers, by Newton, Chambers, and Co., 20 ft. square by 5 ft. deep, Planed Joints, 18-inch Valves and Connections, with Bye-Passes, Travelling and Lifting Gear. In Good Condition. Being Removed for Extension.
Apply to the Secretary, Gas Office, Sutton, Surrey.

LONG EATON GAS COMPANY.

FOR SALE—The Plant at the Sandiacre Gas-Works.
Schedule and further Information may be had from the undersigned.
G. Stevenson, Secretary and Manager.
Long Eaton, near Nottingham.

FOR SALE—Set of Four Water-Lute PURIFIERS, 10 feet Square. Walker's 10-inch Centre Valve, Travelling and Lifting Gear, Grids, Connections, &c., complete. Being replaced by larger ones. Will be sold Cheap for prompt removal.
John Kelly, Secretary.
Bridlington Gas Company,
June, 1909.

THE Romford Gas and Coke Company, Limited, have FOR DISPOSAL: One LIVESEY WASHER, 250,000 Cubic Feet per Diem, with 8-inch Inlet, Outlet, and Bye-Pass Valves and Connections; also One, Two-Chamber COCKEY'S WASHER with 10-inch Inlet, Outlet and Bye-Pass Valves and Connections, each Chamber fitted with Patent Overflow. All in Excellent Condition.
For Price and Particulars, Apply to Mr. W. D. Child, Gas-Works, Romford, Essex.

DRAYCOTT GAS COMPANY.

FOR SALE—The Dismantled Plant at the Castle Donington (near Derby) Gas-Works, viz.: ASCENSION PIPES, ARCH PIPES, MOUTHPIECES, HYDRAULIC MAIN, CONDENSERS, PURIFIERS, CENTRE VALVE, STATION GOVERNOR, EXHAUSTER, and CART WEIGHBRIDGE.
Also at Draycott Gas-Works, FOR SALE (but still in use) FOUR PURIFIERS (nearly new), GAS-ENGINE, EXHAUSTER, &c.
For further Particulars and to view, Apply to the Managers at the respective Works.

STIRLING GASLIGHT COMPANY.

FOR SALE—Two Rotary Exhausters, with Valves and Compensator complete, each capable of passing about 25,000 Cubic Feet of Gas per Hour. Each Exhauster has a separate Steam-Engine. The Exhausters are in Good Working Order, and are being Replaced with larger ones. The Exhausters may be seen working by Appointment with the undersigned. Delivery about August.
Offers to be lodged with the undersigned not later than the 30th inst.
James D. Smith, Engineer and Manager.
Gas-Works, Stirling,
June 9, 1909.

WE have the following New and Over-hauled Second-Hand PLANT FOR SALE:—
GASHOLDER (Two-lift), 50 ft. by 18 ft., in BRICK or NEW STEEL TANK.
GASHOLDER (Two-lift), 50 ft. by 16 ft., in NEW STEEL TANK.
GASHOLDER (8500 cub. ft.), in NEW STEEL TANK (and smaller in stock).
Annular CONDENSERS, 8-in., 12-in., and 18-in. diameter Connections.
Water-Tube CONDENSERS (set of Three), 6-in. Connections.
Morris & Cutler CONDENSER, 8-in. Connections.
Pipe CONDENSERS, from 4 ins. up to 12 ins.
Clapham's WASHER-SCRUBBER, 6-in. Connections.
Tower SCRUBBERS, 7 ft. by 55 ft., 4 ft. by 16 ft., 3 ft. 6 ins. by 16 ft., &c.
EXHAUSTERS and ENGINES (Single and Combined) 2000 to 60,000 cub. ft.
PURIFIERS, 6 ft., 8 ft., 12 ft., and 20 ft. Squares. In sets of 2's or 4's.
STATION METERS, 4 in. to 18 ins., New Drums, Governors, 4 ins. to 10 ins.
TAR and LIQUOR PUMPS, for Hand Working and Steam Power.
BOILERS, TANKS, VALVES, and all Requisites for Gas-Works.
Firth Blakeley, Sons, and Company, Limited, Thornhill, Dewsbury, Yorks.

FOR SALE—Square Station Meter, 10,000 feet per Hour (New Drum by Braddock), Replaced by larger size Rotary Meter.
Apply to T. G. Marsh, Mawson Chambers, 28, Deansgate, Manchester.

THE Directors of the Keswick Gas Com-pany invite TENDERS for the Supply of 2000 Tons of Best Screened GAS COALS or NUTS, to be delivered at Keswick Railway Station between the 1st day of July, 1909, and the 30th of June, 1910, in such Quantities and at such times as may be required.
Tenders, stating Price per Ton, endorsed "Tender for Coal," to be sent to the undersigned not later than the 23rd inst.
The Directors do not bind themselves to accept the lowest or any Tender.
No Form of Tender supplied.
J. H. Brodie, Secretary.
Main Street, Keswick,
June 11, 1909.

THE Directors of the Keswick Gas Com-pany invite TENDERS for their Surplus TAR and AMMONIACAL LIQUOR for Twelve Months from the 30th inst., at per Ton delivered into Contractors' Tanks at Keswick Railway Station.
Tenders, endorsed "Tender for Tar," or "Liquor," will be received by the undersigned on or before the 23rd inst.; but the Directors do not bind themselves to accept the highest or any Tender.
Forms of Tender are not supplied.
J. H. Brodie, Secretary.
Main Street, Keswick,
June 11, 1909.

BAKEWELL URBAN DISTRICT COUNCIL.

TENDERS are invited for the Supply of GAS COAL (1300 to 1500 Tons), and 200 Tons of CANNEL for One Year, delivered at Bakewell Station (Midland).
Forms of Tender and Particulars can be obtained from the undersigned, to whom Tenders must be sent by the 25th of June.
Also for the Purchase of Surplus TAR and LIQUOR during Twelve Months from July 1 next, Delivery free in Purchasers' Tanks at Bakewell Station (Midland).
Endorsed Tenders to reach the undersigned by June 25.
V. R. Cockerton, Clerk.
Bakewell.

FARNWORTH AND KEARSLEY GAS COMPANY.

THE Directors are prepared to receive TENDERS for their Surplus Make of TAR and AMMONIACAL LIQUOR for a Term of One or Two Years commencing the 1st of July, 1909.
Sealed Tenders to be addressed to James Fletcher, Esq., J.P., Chairman, Gas Offices, Cross Street, Farnworth, and delivered not later than Wednesday, the 23rd of June next.
Forms of Tender and any further Information may be obtained from Mr. H. Pickford, Manager.
W. Bromley, Secretary.
Gas Offices, Farnworth,
June 8, 1909.

MARPLE URBAN DISTRICT COUNCIL.
(Gas Department.)

COAL, CANNEL AND LIME.

THE Gas Committee of the above Council invite TENDERS for the Supply of GAS COALS, CANNEL, and Best Hand-Picked Buxton LIME, as required at their Gas-Works, Marple Bridge, during the period ending March 31, 1910.

TAR AND LIQUOR.

TENDERS are also invited for the Pur-chase of the Surplus TAR and AMMONIACAL LIQUOR produced at the Gas-Works during the period ending March 31, 1910. The Tar and Ammoniacal Liquor will be required to be taken direct from the Works by the purchaser.
Forms of Tender (for Coals and Cannel only), and Conditions upon which Tenders only will be received, may be obtained on Application to Mr. Jas. K. Law, Gas Manager, Marple Bridge, near Stockport.
Tenders, endorsed "Coals," "Lime," &c., as the case may be, and addressed to the Chairman of the Gas Committee, to be delivered at the Council Offices, Marple, by Four o'clock p.m., on Wednesday, June 30, 1909.
Charles F. Johnson, Clerk to the Council.
Public Offices, Marple, Cheshire,
June 11, 1909.

READING GAS COMPANY.

TENDERS FOR TAR.

THE Directors of the Reading Gas Company invite TENDERS for the Purchase of their Surplus CARBURETTED WATER-GAS TAR, for One Year, commencing on the 1st of July next.
Specifications for the Contract will be forwarded on Application to the Engineer and Manager, Mr. Douglas H. Helps, Assoc.M.Inst.C.E.
Under the Conditions of the Contract, an allowance will be made for all Water that may be found in the Tar in excess of 5 per cent.
Railway and River Communication direct to the Works.
Tenders, endorsed "Tender for Tar," and addressed to the undersigned, must be delivered not later than Monday, the 21st inst.
The Directors do not bind themselves to accept the highest or any Tender.
A. Canning Williams, Secretary.
159, Friar Street, Reading,
June 2, 1909.

A.B.C. Code, 5th Edition used. Telegrams: "Promerope, London." Telephone No. 6600 Central.

A. E. PODMORE & CO.,

Gas Lighting Engineers and Patentees,

HIGH POWER LIGHTING SPECIALISTS,

34, CHARLES ST., HATTON GARDEN, LONDON, E.C.

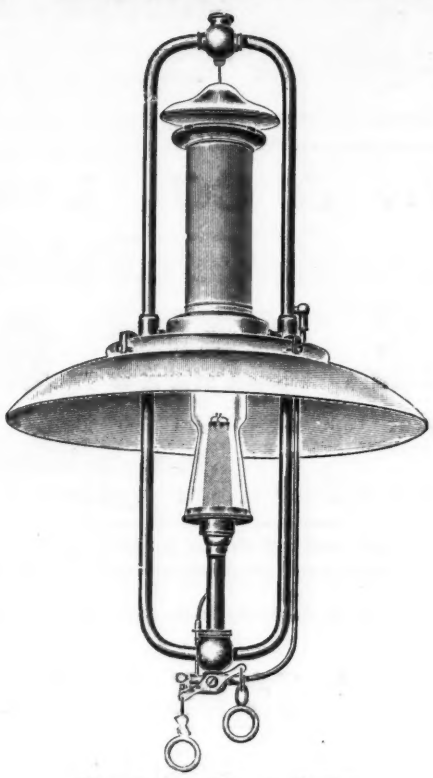
Patentees of the POPULAR LAMP, with Dust and Insect Proof Burners.

FOR ALL COUNTRIES.

DUST PROOF BUNSEN BURNER LAMP.

School Lighting a Speciality.

Absolutely the best and most Efficient System of inside lighting for dusty positions.



No. 6 A. Fig. 6 Series.
Length over all, 2 ft. 3 in.

We have recently lighted a Black Lead Powder Mill and a Flour Mill with this Lamp.

Can be used without Globe or Inner Cylinder Glasses.

Porcelain Reflector.

Two-Light Inverted Burner Lamp. Porcelain Reflector.

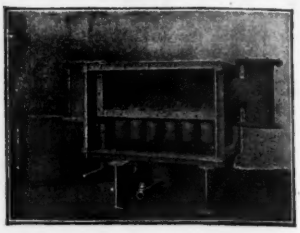
KIRKHAM, HULETT & CHANDLER, LD., 132 & 133, Palace Chambers, WESTMINSTER, S.W.

"Standard" Specialties.

WASHER-SCRUBBER.

"HURDLE" GRIDS.

"RACK" GRIDS.



TAR & NAPHTHALENE WASHER.

Wrought-Iron

And Fittings & Accessories.

LAMBERT BROS., WALSALL,

MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.
BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF
WARNER'S PATENT MARKET GAS STAND-PIPE.
LONDON: LAMBETH BRASS & IRON CO., LTD., 91 & 93, SOUTHWARK ST., S.E.

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Proprietors of

ALDWARKE MAIN, CAR HOUSE, & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·20.

VERY FREE FROM IMPURITIES.

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THERE IS A MORAL TO BE LEARNT

from our recent Advertisement in the "JOURNAL OF GAS LIGHTING," which showed a Bed of our Patent Machine-made Retorts that had been in constant use for **2108** days—nearly **6** Years.

THE BEST ARE THE CHEAPEST

BUY THE BEST.

If you have not already asked us for a Tender for this Year's requirements, we shall be pleased to have the opportunity of quoting you.

THE LEEDS FIRECLAY COMPANY, LTD.,

Telegrams: "Fireclay Wortley Leeds." **WORTLEY, LEEDS.** Telephone Nos. 610, 612, 1649, & 2322.

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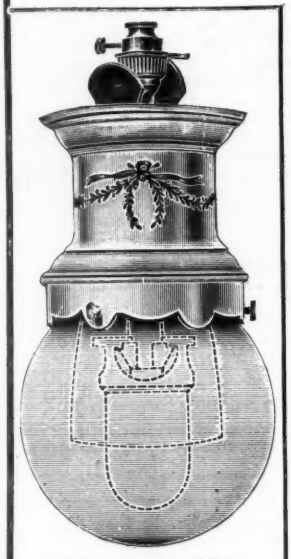
THE VESTA-VERITAS

HIGH-POWER INVERTED BURNERS.

CREAM CHINA CASING (Registered) WITH GOLD DECORATION.

BRITISH MANUFACTURE.

Strongly Made and Thoroughly Reliable.



Large Size, G 7795.

LARGE SIZE.

110 Candles for under 4 feet of Gas per hour.

Takes Graetzin Mantles and Glass.

BIJOU SIZE

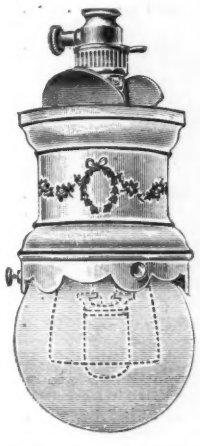
(Specially suitable for Domestic Lighting).

70 Candles for under 2½ feet of Gas per hour.

Takes Graetzin Bijou Mantles and Glass.

Both sizes are fitted with improved Gas Adjuster and convenient Air Regulator, the thumb-screw of Adjuster and lever of Regulator made of non-heat-conducting material.

WRITE FOR PRICES.



Bijou Size, G 7917.

VERITAS GAS MANTLES.

BRITISH MADE.

For all Upright and Inverted Burners.

The Pioneer Ramie Mantle and still the Best.

SPECIALLY SUITABLE FOR STREET LIGHTING AND MAINTENANCE PURPOSES.

Write for Particulars of our Various Qualities and Prices.

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